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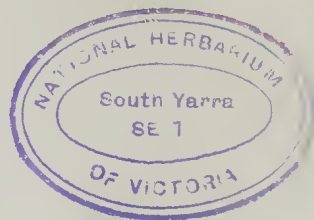
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Reports and Statements.

Statements and opinions in articles in this publication are those of the authors concerned, and are not necessarily the views of the Section.

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THE HERBARIUM

its Function and Use to the Community

by NOEL LOTHIAN, *Director Botanic Gardens*

The word Herbarium (or *Hortus siccus* of old writers) is used to denote a collection of dried plants, systematically named and arranged in containers for protection and ready reference. Such a collection is not essential, but it is most helpful in the study of systematic botany, and whenever this study is undertaken (whether at an institution or by a private person) an Herbarium is usually established.

The advantage of having a good Herbarium available is patent when compiling records covering plant localities and habitats, dates of flowering, distribution of species, etc. However, unless the Herbarium has been properly maintained and the initial collections correctly made, little advantage is gained by poor or incomplete collections.

METHOD OF COLLECTING

Many specimens in Herbaria throughout the world are fragmentary, and consequently of little use to a critical worker. This condition may be due to the difficulty in collecting, e.g. insufficient collecting equipment, difficult climate, i.e. tropics; but more often because

insufficient care and attention has been given to the plant material at the time of collecting.

When collecting, every effort should be made to collect representative material of the particular species required. For woody plants a series of specimens showing twigs, leaves, flowers as well as fruit should be made, while with herbaceous plants (and if the size of the plant permits) the whole of the plant, including roots or root stock, but anything less than a representative collecting is of little use. With tall-growing herbaceous plants, basal as well as stems and leaves must be collected. But collecting the specimen is only half the job. Sufficient details regarding the collecting locality, such as its name, habitat of the plant, associations, date, etc., must also be carefully recorded. So that this information will not become separated from the specimen, a collector's (or field) book is usually kept. At each collecting site relevant data such as stated above are recorded. Each plant, as it is collected, is recorded in the field book, then numbered, and a tag bearing this number is then attached to this specimen. Should seed be collected, this is given a similar number. In

this way details concerning a particular specimen are recorded in permanent form.

DRYING OF SPECIMEN

Field presses may be used or the collected plants placed in a suitable container and pressed at the end of the day's collecting. A number of types of presses are available, but those which are built up of layers of newspaper and corrugated cardboard, and held together by straps, prove very satisfactory. During the first week in the press the plants will need dry papers nearly every day.

In relaying out the specimen, care must be taken to ensure that it is displayed to the best advantage. After the specimens are dried they should be poisoned with a solution of corrosive sublimate or some other suitable chemical.

MOUNTING SPECIMENS

Specimens of one species, usually of one collecting, are mounted on a sheet measuring approximately 11 in. x 17 in. Mounting is preferred to allowing the specimens to remain loose in a folded sheet, as damage to the specimens can easily occur. At either the right or left-hand bottom corner a label is placed, on which all relevant data, including the name of the plant, locality, collector's name, etc., should be recorded. The mounted specimens should then be sorted into species, genus and families, and placed in appropriate containers. These may be boxes or folders, which can then be placed in steel cabinets, or other insect-proof cabinets. Providing periodic fumigation and the constant use of paradichlorobenzene in the actual containers is made, carefully dried plant material will keep indefinitely.

IMPORTANCE OF HERBARIA

Herbaria are primarily useful in preserving complete collections of a country's vegetation. Frequently specimens held represent extinct species, and because of the completeness of range of species, these collections are invaluable when compiling and preparing floras. Such floras may cover a limited area, or they may be nation-wide, but without an Herbarium such works can be incomplete. However, it must never be forgotten that Herbarium material should be used only to supplement good field work, for frequently species described from Herbarium material prove to be mere forms of an already known and defined species.

While an Herbarium primarily covers the indigenous vegetation, the collections should include plants commonly cultivated in the region. This, of course, will cover exotics, whether ornamental or otherwise, and whether they are from deliberately planted specimens, or adventitious (weeds, etc.).

In Adelaide the lack of a single unit Herbarium has been overcome by that strenuous, indefatigable worker, Mr. J. M. Black. Because of his untiring efforts a complete flora of this State has been produced (and is now in a second edition), but had a central Herbarium been available Mr. Black's task would have been considerably eased. So that subsequent workers will not encounter the same difficulties which have been present, due to the lack of a centrally situated Herbarium, it is hoped that one of these days all interested parties will discuss the possibility of establishing such an Herbarium. For not only will this assist the scientific worker, but will make the determining of material sent in by organisations or individuals a much simpler task.

A NEW SOUTH AUSTRALIAN SHELL

by W. G. BUICK, A.U.A.

and W. M. BOWDEN

Of all the various South Australian shells one group has received more attention in conchological literature than any other. The two species in this genus are uncommon enough to have no common name. They belong to the genus *Ehippodonta*, a name which is an allusion to the unusual way in which the teeth of the hinge ride on one another.

The two species hitherto known were named by Professor Ralph Tate, who was a leader in the foundation of the Field Naturalists' Section, in the Proceedings of the Royal Society of South Australia; *Ehippodonta lunata* in 1886, and *E. macdougalli* two years later.

Ehippodonta are renowned for at least two characteristics, both of which are illustrated in the new species found by Mrs. J. J. Turnbull, an enthusiastic member of the Conchological Society of S.A. Unlike most other bi-valves they cannot close their valves together so that they are extended in one plane, and the animal is always exposed on the under side. The foot occupies the greater part of this area, and it is relatively large, so that the animal crawls rather like a snail. The other characteristic is that *Ehippodonta* is commensal: it lives in association with a prawn (*Axiu plectorhincus*). This prawn makes a burrow of mud between and beneath the stones of reefs. A yellowish sponge is also usually associated with the burrow in which these tiny shells live with no harm, and presumably with benefit, to the prawn and themselves.

Above: *Ehippodonta macdougalli*
Centre: *Ehippodonta turnbullae* sp. nov. Holotype
Below: *Ehippodonta lunata*



As far as is at present known, all three species of *Ephippodonta* are confined to South Australian waters.

EPHIPPODONTA turnbullae sp. nov.

Shell small, equivalve, almost equilateral, oval in outline, yellowish-white, flat.

Umbos prominent and smooth. The median areas of the valves are crowded with papules, which are arranged in irregular rays. As these approach the ventral margin they increase by bifurcation to about 46 at the margin.

Ventral margin entire; dorsal margin a straight line, valves rounded at the ends of the dorsal line.

Dimensions: Length, 10 mm. Umbo-ventral radius, 4.5 mm.

Localities: Type, Long Beach, five miles north of Stansbury, York Peninsula, South Australia; also Corny Point.

Remarks: The general characteristics of this species leave no doubt of its generic position. It varies from E. lunata Tate by the presence of papules. From E. macdougalli Tate it varies in the following respects: Entire ventral margin, prominent umbos, the rays which increase by bifurcation rather than by intercalation, papules closer together and not placed on ribs, oval instead of circular outline. The type specimen illustrated here is being placed in the South Australian Museum.

Some observations on the Fauna associated with the

CONIFEROUS FORESTS

of the South-East (S.A.)

by C. K. PAWSEY, Dip.For.

INTRODUCTION

The relationships between the quite extensive coniferous forests established during the past forty years and the fauna of the region—particularly the bird life—are still in the process of developing. It is early yet to foretell just what the ultimate associations will be. These planted forests, so entirely different from the native "bush", already total well over 100,000 acres in the Lower South East, and will continue to extend considerably.

The casual observations on which this note is based have been made chiefly on only one of the several units composing that area, namely, Mount Burr Forest Reserve, but here there are both the oldest stands of any extent

and the greatest area of woods approaching the managed state to which the animal and bird life must finally be adjusted for survival.

The plantations here range up to over 40 years in age, with many regenerated areas, in the second rotation.

For the most part the native fauna has had to recede before this wholesale afforestation with softwoods. And this is not to be wondered at in view of the contrast that exists between the original and the substituted forest.

The native dry-sclerophyll forest was semi-open with many and various under-storey shrubs and herbs contributing to provide the food supply for a balanced population of insects, reptiles, birds and animals. On the

other hand, the coniferous forest consists virtually of a single tree species—almost always *Pinus radiata* (D. Don), "Monterey pine" of California—crowded so densely for most of its life that any ground cover is extinguished after the canopy has closed. Indeed, in an unthinned pine stand very little light reaches the ground unless the site is a poor one, and in that case bracken is practically the only plant to persist, anyway.

BIRDS OF THE ADULT PINE WOODS

Conditions within stands of, say, fifteen years and upward favour primarily those species that find their food among the litter on the ground. The first bird observed to have adapted itself to life entirely in such woods was the Ground Thrush (*Oreocinclla lumulata*) which had frequented the dark tea-tree thickets of the swamps.

For many years this was the only bird inhabiting these woods, but now the White-winged Chough (*Corcorax melanorhamphus*) is also encountered—another ground-feeding species, though it is not certain how much time it may spend outside the pines.

As the adult woods are repeatedly thinned so the birds frequenting them become increasingly numerous, but so far it seems that no other species can claim to belong wholly to these taller stands, with the exception of the Black Cockatoo (*Calyptorhynchus funereus*).

This bird has multiplied markedly since the advent of the abundant food source provided by the pine cones. From being a relatively rare species, it is now counted in hundreds in this district.

Flocks of from a dozen or so to about one-hundred-and-fifty are commonly seen flapping their noisy way to fresh feeding-grounds, though it is believed that they do not roost in the pines. Certainly the pines cannot furnish nesting hollows for them, and they will need the existence of tracts of native forest if they are to continue to flourish. The "cockies" extract the seed at any stage after the cones are full size, even though they may be six months from maturity.

Actually their depredations on the commercial seed supply are becoming of such magnitude that drastic action may be required to reduce their numbers again.

BIRDS OF THE SAPLING WOODS

In those stands that have only just killed their lowest limbs, together with still younger plantations, the Brown Thornbill (*Acanthiza pusilla*) and the White-browed Scrub-wren (*Sericornis frontalis*) have been at home for many years. The introduced Blackbird (*Turdus merula*) is also established in these young woods over quite a number of localities.

The nests of the Ground Thrush, the Brown Thornbill and the Blackbird have been found in stands of this nature, and, presumably, the Scrub-wren also nests therein. This is the ultimate criterion, surely, of harmony between a species and the environment.

BIRDS OF THE JUVENILE WOODS

In the plantations—and naturally regenerated areas—whose canopy has not closed the bird population is more varied and plentiful. But this is in such measure as the pines are supplemented by the remnants of the original flora or, at least, by grasses and composites that have followed the preparatory burn.

Associated with some or all of the areas in this category are such species as:

White-browed Scrub-wren, Brown Thornbill, Superb Blue-wren, Red-browed Finch, introduced Goldfinch, White-fronted Chat, Heath-wren, Yellow-winged Honey-eater, Spinebill Honey-eater, Yellow Robin, Rufous Whistler, Bronzewing Pigeon, together with the Nankeen Kestrel, Brown Hawk, Goshawk, and other birds-of-prey. Even the Wedge-tailed Eagle has been occasionally observed on the ground in these places.

Obviously, these represent some of the more permanent or less nomadic fraction of the species comprising the total check-list for the district, and the nature of the original vegetation in each case determines which birds persist in any given plantation during its early stages—before it becomes a forest.

These young plantations containing native plants in appreciable numbers can occur in only the first rotation of the pines, and there will not be the same scope in subsequent rotations for these temporary associates. Consequently many species at present maintaining some foothold in this coniferous region are likely to suffer a further diminution of their range, though for many years to come there will remain for them a refuge in the inlying blocks of Stringybark "bush", not to mention the open country surrounding the forests.

BIRDS OF THE SLASH AREAS

Between the final felling and the subsequent regeneration of a stand, either by planting—after burning the "slash"—or naturally and without such a burn, the slash area tends to attract another group of birds.

Crimson Rosellas, Goldfinches and Pied Currawongs find seeds and berries there, and in one locality Emus can be added to the list. Incidentally, it is pointed out that the Kangaroo Apple (*Solanum aviculare*) often appears again in these places, and no doubt augments the forage supplied by the pine seed on the ground.

BIRDS OF THE FOREST MARGINS

The Gray Shrike-thrush (*Colluricincla harmonica*) and the Magpie (*Gymnorhina hypoleuca*) are regular dwellers on the outskirts of the plantations and around forest settlements. They both move about in or over the fringes of the pine woods, and are increasing in numbers probably; taking a broad view, they may warrant inclusion among the associates of the pine forests.

Similarly, stray visitors and birds of passage such as the Flame and the Scarlet Robins, the Black-faced Cuckoo-shrike, the Cuckoos—three of them—Snipe and other migrants or nomads may be mentioned. They sojourn for a while only, but in the course of time they may prove sufficiently constant in their visits to merit a place in a comprehensive list of species for this region.

Reference must also be made to the various waterfowl—not strictly forest birds, and therefore not expected to be affected by the changes in the forest, perhaps. Few of the swamps fill for as long as formerly owing to the higher moisture consumption of these dense, new forests, and the birds cannot be independent of this fact.

ANIMALS IN THE PINE WOODS

Other forms of life are even less in evidence so far than are the birds, but the following remarks cannot claim to be comprehensive.

Lacking sufficient insects and other small fry, it is not surprising that snakes and lizards do not find the pines a congenial habitat. The Stumpy-tailed Lizard (*Trachysaurus rugosus*) is an exception, being mainly if not solely herbivorous, and is not uncommonly met with in any grassy openings, including the fire-breaks, particularly where these traverse stony outcrops.

The Ring-tailed 'Possum (*Pseudocheirus lan'ginosus*) is definitely breeding in appreciable numbers within any of the woods past the sapling stage. This little animal has been observed to feed on the foliage and on the young conelets, and sometimes on the bark of the twigs of the pines. Its choice of the latter two items is not popular, of course, with the forester, but as yet the damage is of no consequence. Nests are made well up from the ground in the branches of the pines themselves, so that the adaptation would seem to be complete.

The Echidna (*Tachyglossus aculeata*) is active still in some stands of even twenty years of age, but is obviously associated with old hardwood stumps and logs harbouring colonies of termites. As this residual debris disappears so will the Echidna retire to the remaining Eucalypt forest, in all probability.

No remarks would be complete without reference to the introduced Rabbits and Foxes and, incidentally, the Deer (at Penola F.R.).

Wherever there is grass or other suitable herbage the rabbit is at home, so that it would

thrive in all juvenile plantations but for the constant trapping. However, in adult woods with well cultivated fire-breaks, there is usually insufficient sustenance for these voracious animals, so that such portions of the forests are free from them. Actually, with mosses and the edible, symbiotic fungus *Boletus*, a few rabbits can live even in adult stands, but not all the year round.

Foxes make use of any suitable spots within the forests for excavating their burrows. As they will hunt over many miles in a night, it

matters not to them if their den be surrounded on all sides by a mile of pine woods lacking in game.

The Deer (species not ascertained by the writer as yet) are regular visitors to the young plantations near the Victorian border. They probably spend as much time in the native forest as in the pines.

It is repeated that the adjustment between the fauna and the relatively new coniferous forests is in the process of taking place, and may not be complete for many decades yet.

Notes on

WATER-YIELDING PLANTS IN AUSTRALIA

by H. A. LINDSAY

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Methods of finding water in the semi-arid and arid regions of Australia can be divided into four broad classes: (1) The location of surface water in the form of pools, springs, soaks and rockholes by observing the tracks of animals, noting the presence of birds never found far from water, or by watching the flight of birds such as the wild pigeons, which always drink at sundown; (2) Digging wells at spots in sand dunes, either coastal or inland, where potable water is likely to be found at shallow depth; (3) Digging up frogs which are hibernating during a drought beneath the dry mud of lagoons and swamps, and squeezing the stored water from their bodies; (4) Obtaining water from the roots or trunks of some species of native plants. This paper will deal only with the last-named.

There are four main ways in which potable and perhaps life-saving water can be obtained from Australian trees and plants. First in order of importance, chiefly because it is most useful in semi-arid sand-dune country where surface water is non-existent, is draining it from tree roots. The procedure to be adopted can be summarised as follows:

From a vantage-point the surrounding terrain should be examined and a tree or bush selected which is larger than the rest, has a healthy, flourishing appearance, and stands alone in an open space or grows on the edge of a clump. Such plants are usually found on the sides or the summits of the dunes; those which grow in the deepest hollows should be avoided. Trained powers of observation can

save an immense amount of useless labour in this preliminary selection of a suitable tree or bush, and it should also be kept in mind that some families of plants will not yield so much as a drop of water; outstanding among these are the casuarinas. Those which will yield it belong chiefly to the eucalypts, with the Water mallee (*E. oleosa*, F.v.M.) of the fringes of the Nullarbor Plain as the best-known example. Some species of *Banksia* also have this valuable property, and so do many Acacias, several Hakeas, and at least one Grevillea. It is also possessed by at least one species of kurrajong (*Brachychiton gregorii*, F.v.M.), a calathamnos and the boobialla (*Myoporum insulare*, R.Br.), of the Coorong in South Australia.

The greatest quantity of water is obtained if the roots are taken up and drained at dawn after a cool night; the least if it is done in the middle of a hot and windy day. There are several ways in which the roots can be located, without a lot of digging when a tree has been selected; one is to lie on the ground and "sight" the barely perceptible ridges of sand or soil above each root. The ridges can also be found by the shadows which they cast at sunrise or sunset. If the tree or hush is small their whereabouts can be located by grasping the trunk and shaking it vigorously, at the same time watching for the cracking or moving of the ground above the roots.

Roots which contain water are never very large, few being more than four or five inches in circumference; when cut they reveal no heartwood, their bark is usually much smoother than that of other roots, and they are very uniform in thickness, with little or no taper. They never lie far beneath the surface of the ground, some are only six inches down, and fifteen inches is about the extreme depth. Being both flexible and strong, it is

usually unnecessary to dig up the entire length of a root; if portion of it is uncovered and then cut through or broken, yards of it can be pulled up in soft soil or sand, as if it was a piece of rope which had been buried.

To obtain the water they are cut or broken—the former for preference—into two-foot lengths, and stood to drain with the end which was nearer to the tree downward. When the water ceases to drip from them an additional, and appreciable quantity can be obtained by blowing down each in turn.

A most important piece of information was given to the writer by N. B. Tindale, who had observed aborigines using it. If only a few drops of water come from roots, this should be used to moisten a piece of clay to a putty-like paste. With the ball of the thumb this damp clay is then forced into the pores of the root on the end which was farther from the tree, in order to seal them. If these sticks are then laid on a gentle fire, water will bubble and drip from the unsealed ends. The sight of water coming in this way from the ends of wet sticks in a fire is too familiar to most people for the idea to need further elaboration.

From a single piece of root, twenty feet in length and three inches in circumference after the bark had been removed, the writer has frequently obtained nearly a pint of clear and almost tasteless water, and sometimes double this quantity has been secured.

The second method is to obtain water from the trunks of saplings of many species of eucalypts and several species of melaleuca. Select young trees which have obviously grown rapidly and have a large head of foliage. These should have a diameter of about four inches under the bark close to ground level, and a length of from eight to twenty feet. Cut or break off close to the ground, cut off the branches and leafy head, elevate the butt end,

place it in the fork of another tree, and hold the small end over a container. Beads of water form almost at once on the cut surface, and the water drips steadily for from five to fifteen minutes. As soon as it ceases to drip, cut the sapling in halves, reject the thick end, and the flow will start again. Continue until a piece about eighteen inches in length is left, and the last of the water is removed from it by blowing through it.

When the scrub contains many different species of trees, and they are new to the experimenter, much time can be saved by chopping a piece out of each. If heartwood is met in any species, or the annual rings are distinct, the chance of that species yielding water is remote. If the sapling shows no rings and is sapwood right through, it will probably yield water.

The average sapling yields up to half-a-pint of clear and practically tasteless water; but again it is possible to obtain double this quantity. The most surprising example of securing potable water by this method in apparently unpromising surroundings was demonstrated repeatedly in the mangrove swamps which fringe much of the northern coastline of Australia. No species of mangrove tested by the writer ever yielded water, and one, known as the "Milky mangrove", exuded a thick, white sap which is a corrosive and virulent poison, but scattered through these swamps, on rises often no more than a foot above high-tide-mark, are thickets of a paper-bark teatree (*Melaleuca* spp.). On numerous occasions a hundred of these teatree saplings, cut down, turned upside down, and allowed to drain into pannikins, crowns of felt hats, etc., would yield sufficient water to slake the thirst of a class of fifteen Army or Air Force personnel who had been made very thirsty by travelling through the humidity of the swamps.

The third method of obtaining water from native flora will work with but one species of tree in one locality: the baobab or "Bottle tree" (*Adamsonia gregorii*, F.v.M.), of the northern portion of Western Australia. A young tree about nine inches in diameter is selected; a vertical strip of bark is removed, and the soft, spongy sapwood is cut out in chunks of convenient size and chewed. Each piece of sapwood yields about a teaspoon of water with a pleasant, sweetish flavour, and is reduced by the process of chewing to a wad of fibres.

The fourth method will also work with but one species of tree: the "Bottle tree" (*Sterculia rupestris*), of Queensland. V-cuts are made in the bark, one above the other like the chevrons of a sergeant, connected by a vertical cut down the centre, and along this the water trickles, to be diverted by a piece of leaf used as a spout into a container.

The writer, taught by his father when very young, and later helped by aboriginal playmates, learned to obtain water when thirsty from the roots or trunks of trees. When in country where no surface waters existed, it became almost as automatic to do it as to turn a tap when in a city. In later years it became obvious that not one white man in a thousand—even those born and reared in the bush—knew anything worth mentioning of this subject; at outback police stations the writer saw pathetic last messages, some scratched upon the blackened outside of billycans, written by men who had died of thirst. The full tragedy was revealed when a visit was paid to spots where the bodies of some of the victims had been found; only too often, for want of a little elementary knowledge, the man had died where an aborigine could have obtained sufficient water to keep him alive.

One of these tragedies attracted a great deal of attention when Hitchcock and Anderson died of thirst beside their stranded plane in the country south of Wave Hill, near the border between Western Australia and the Territory. Moved by the fact that these two airmen had died of thirst with water in the roots of the scrub six inches under the soles of their boots, the writer tried to draw attention to the need for training airmen in the rudiments of water-finding by writing several press articles on the subject.

Shortly after the outbreak of war in 1939 the writer again brought the subject to the notice of the Army and the Royal Australian Air Force, but in each case the offer to supply information on the subject was rejected. The writer was not the only person to do this; the Director of the South Australian Museum (Mr. H. M. Hale) and the Ethnologist (Mr. N. B. Tindale) made similar offers, and the latter, on request, prepared a great deal of data on the subject and forwarded it to R.A.A.F. headquarters. No use appears to have been made of this information, and when Mr. Tindale applied to have the data returned to him, the manuscript could not be found.

This state of affairs persisted through 1940 and part of 1941. When the writer attended a Volunteer Defence Corps training camp, a copy of a precis dealing with the subject was handed to one of the instructors, Supt. W. F. Johns, of the S.A. Police. Mr. Johns showed it to the then Commissioner of Police (General Leane), and as a result the writer was authorised to act as an instructor to the V.D.C., but both our own Army and the R.A.A.F. remained uninterested. Then the American Armed Forces arrived in Australia, and General Albert Waldron (U.S. Army) sent for the writer, and he was appointed as an instructor in bushcraft to the American troops.

Before long our own Army became interested, and the writer, who had been rejected on previous attempts to join the A.I.F. through being over the age limit, was allowed to enlist as an instructor. Unfortunately, the only opening for a bushcraft instructor was in the Army Education Service, which turned out to be a most unsuitable branch of the Army for such work.

Very illuminating was the arrival of a Squadron-Leader from the R.A.A.F. to obtain "every possible piece of information on this subject". When the writer informed him that all the data had been in the possession of his own H.Q. for the past two years, the Air Force man's remarks were very heated.

Subsequently, when Australia was in danger of invasion by the Japanese, the writer was sent to Army and R.A.A.F. units to give instruction in this subject of finding water in an emergency, as well as in lighting fires without matches, identification of edible plants, building of fish traps, use of birds as sentries, and the kindred subjects usually grouped under the heading of Bushcraft. At the outset the writer was filled with doubt as to his ability to demonstrate the obtaining of water from trees and shrubs in areas never visited previously, and in a flora which was strange to him, but this was soon replaced by a feeling of confidence, for anywhere on the continent the fundamental rules were found to hold good. After two years of instructing the writer could claim that no demonstration had ever failed, and that in nearly every area of scrub or forest in Australia water could be obtained from the trunk or the roots of some species of tree or plant.

Much of what had been published on the subject was found to be false. As far as could be ascertained, little or nothing appeared in

scientific papers—an extraordinary fact, when one considers the immense areas of arid or semi-arid country in Australia, and the long list of deaths from thirst since white settlement began. Most botanists appear to overlook this really invaluable property possessed by so many elements of our flora. What information had been published took the form of generalisations in “popular” articles, and it was obvious that nearly all the writers had not tried the expedients which they so cheerfully recommended. One death from thirst and three narrow escapes from a similar fate were directly traced to some of this misinformation, typical of which is the common but quite erroneous advice to “go into the hollows” when seeking water-yielding trees in sandhill country. As already pointed out at the commencement of this paper, the opposite thing holds good: the best trees are found on the slopes or crests of the dunes.

For a time the writer feared that water obtained from flora with which he was not familiar might contain a poisonous principle; the fact that strychnine is obtained from plant roots, and that some tubers and bulbs are not fit for use as food until poisons such as hydrocyanic acid have been leached from them, was kept in mind. It was found, however, that two simple rules would cover this possibility, and the classes were cautioned never to drink water from roots which also exuded a milky sap, or water from either stems or roots which had a sharp or bitter taste. On the other hand, it was found that water obtained from plants, whether they were shrubs of semi-desert dunes or the lianas of tropical rain forests, was always sterile—an important fact, inasmuch as men on active service cannot always sterilise their drinking water, and many tropical streams are contaminated.

The writer regrets the fact that, not being a hotanist, further details as to species and location cannot be given. This opportunity is taken to place on record the fact that invaluable help with botanical problems was willingly and promptly given by botanists, especially by Miss Gladys Carey, of the University of Sydney. However, many species could not be identified because they were not in flower at the time, and, as much travelling was done by air with severe restrictions on the amount of gear which could be carried, it was impossible to make collections of the leaves, flowers and fruits of water-yielding flora for post-war study.

The conclusions to be drawn from these experiences are:

(1) Botanists seem to have neglected to place on record the very useful property possessed by many species of our native flora of yielding potable and perhaps life-saving water.

(2) The opportunity exists for a botanist *who is also a good bushman*, to carry out continent-wide field investigations, listing the water-yielding plants of Australia and the areas in which they are to be found.

(3) Such information should be of vital interest to the Armed Services if Australia is ever again in danger of invasion.

(4) Water-finding should be part of all Navy, Army and Air Force training, since the seaman who is cast ashore after his ship is sunk; the soldier cut off from his unit; and the airman who makes a forced landing, may find themselves reduced to the status of primitive men, and their chances of survival are greatly enhanced if their training enables them to act as an aborigine would do in a similar plight.

Report of the Motor Bus Excursion to

Cockatoo Valley on 12th June, 1950

A large party of members and friends journeyed to the Cockatoo Valley area via the Torrens Gorge and Williamstown, returning by way of Sandy Creek and Gawler.

A few miles above Athelstone the party noticed flowering shrubs of the rare tree-violet (*Hymenanthera angustifolia*). The spiny nature of this plant ensures a certain degree of self-protection, and is responsible for a striking resemblance to a greyish box-thorn bush or a straggling olive tree.

Silky tea-tree (*Leptospermum pubescens*) and a white bottle-brush (*Callistemon salignus* var. *australis*) grew abundantly in the hed of the stream. The characteristic shrubs which clothe the steep, rocky sides of the gorge also claimed our attention. Species which grow amongst the quartzite screes and dripping ledges are *Xanthorrhoea quadrangulata*, *Pomaderris obcordata*, *Lasiopetalum Baveri* and *Dodonaea viscosa*.

Near Cudlee Creek it was obvious that we had entered the domain of *Eucalyptus elaeophora*, which forms interesting hybrids with closely-allied species.

A few miles past Williamstown we noticed several *Cassias* beside the road. These usually indicate the presence of sand, which we found

plentiful at our stopping-place in an area of virgin scrub. We saw the beautiful *Eriostemon brevifolius* in full flower, and the intricate *Prostanthera chlorantha*, bearing its unusual green flowers. Both of these shrubs are rather rare. *Cryptandra tomentosa* was also in flower beside the road, while on a hillside an *Aciunthus* and a *Pterostylis* displayed their orchidaceous blooms.

Late in the afternoon the uncommon adder's tongue fern (*Ophioglossum coriaceum*) was observed near the whispering wall. A really enjoyable day was completed by a wonderful view of a brilliant scarlet sunset.

K. W. T. DUNSTONE,
(Leader).

CORRESPONDENCE

I have pleasure in advising you of the receipt of five volumes of minutes of your Society (13th November, 1883—23rd October, 1923), which have been deposited at the Archives for permanent preservation. These records are, of course, available for consultation whenever required.—Yours faithfully,

J. McLELLAN,
(Archivist).

ANNUAL REPORT

of the Field Naturalists' Section of the Royal Society of South Australia (Inc.) for the Year Ending 30th June, 1950

DURING THE PAST YEAR, thirty-nine Saturday afternoon excursions have been held; also three bus trips were taken on public holidays. These for the most part have been reasonably well attended, but there is room for improvement in this respect, and we would like to see a larger number of members participating in the outings during the coming year.

The outings included visits to the beaches and hills; excursions were also made to the Zoological Gardens, the Botanic Gardens, and the Waite Arboreatum; and we extend to those people who led these outings our sincere thanks.

Eight General Meetings were held during the year, the average attendance being thirty-eight. The talks delivered consisted of the following:—

Sanctuary Management	-	-	-	-	Mr. H. A. Lindsay
Fishes and their Defensive Colouring	-				Mr. H. M. Hale
Gem Stones	-	-	-	-	Mr. H. Hooper
Evolution	-	-	-	-	Professor A. Abbie
The Botanic Gardens, Past, Present and Future	-	-	-	-	Mr. T. R. N. Lothian
Algae	-	-	-	-	Mr. Womersley
A Strip Film Evening	-	-	-	-	Mr. Swann and the Secretary
Botanical Impressions of England and Else- where	-	-	-	-	Miss C. M. Eardley

Thirteen new members were elected during the year, and eleven resigned, leaving our membership standing at eight Honorary, ten Life, 183 Financial, and 46 Unfinancial.

“S.A. NATURALIST”

Our Journal has been published once this year. It consisted of three issues in one, comprising twenty-eight pages, instead of the usual number of ten. This was done to complete Volume 25, to enable us to revert to a pocket-size Naturalist, thus falling in line with the Natural History publications of similar bodies in the other States, and to meet the high cost of printing.

ARBOUR DAY

Arbour Day was held on 6th May, under the leadership of Mr. A. G. Edquist. Members participating in this event planted some twenty-seven species of trees in the Native Flora Reserve at National Park. Our thanks are due to Mr. Lothian for supplying the specimens and the necessary tools.

The gift of land which Mrs. Page so generously donated to our Section has unfortunately now been lost to us, as a reservoir is to be constructed at Myponga, and will eventually cover portion of the land.

INCORPORATION

The Chairman has consulted the Registrar of Companies, and gone thoroughly into all legal aspects of our becoming an incorporated body and still remaining within the framework of the Royal Society. Correspondence has passed between the Committee and the parent body, and Mr. Lothian is keeping in touch with the Royal Society Council, so we hope that early in the coming year we shall be able to proceed with this important step.

The Conchology Club of South Australia has now withdrawn from the Field Naturalists' Section, and revived the Malacological Section of the Royal Society. The committee and members of this Section take this opportunity to wish them every success in their new venture.

Members of the Field Naturalists' Section who are interested in Conchology are catered for by the Conchological Society, which still remains associated with our Section.

It was decided in Committee that an annual donation of Five Guineas and Free Membership to the Section for one year be presented to the University as a prize in either Zoology, Geology or Botany.

In concluding this Report, the Committee wishes to thank all who have helped make this year a success, particularly Mr. Lothian for the very able way he has chaired our meetings.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE PERIOD 31st JULY, 1949, TO 30th JUNE, 1950

We have examined the books and vouchers setting forth the transactions of the Field Naturalists' Section of the Royal Society of S.A. (Inc.) for the period 31st July, 1949, to 30th June, 1950, and certify that the above account of Receipts and Expenditure is correct.

Page Seventeen

The Field Naturalists' Section of the Royal Society of S.A. (Inc.)

LIFE MEMBERSHIP FUND

	£	s.	d.		£	s.	d.
Balance at Bank, 31st July, 1949 -	57	19	1	Balance at Bank, 30th June, 1950 -	59	4	2
Bank Interest - - - -	1	5	1				
	<hr/>				<hr/>		
	£59	4	2		£59	4	2

COLOURED PLATE FUND

	£	s.	d.		£	s.	d.		
Balance at Bank, 31st July, 1949	-	10	11	11	Balance at Bank, 30th June, 1950	-	10	16	3
Bank Interest	-	-	-	4	4				

CONSERVATION FUND (BELAIR)

	£	s.	d.		£	s.	d.				
Balance at Bank, 31st July, 1949	-	22	19	8	Balance at Bank, 30th June, 1950	-	23	9	7		
Bank Interest	-	-	-	9	11						
				<u>£23</u>	<u>9</u>	<u>7</u>			<u>£23</u>	<u>9</u>	<u>7</u>

CONSERVATION FUND (NEW)

	£	s.	d.		£	s.	d.
Donations - - - - -	2	15	3	Balance at Bank, 30th June, 1950 -	2	15	3
	<u>£2</u>	<u>15</u>	<u>3</u>		<u>£2</u>	<u>15</u>	<u>3</u>

Examined and Certified Correct.

(Signed) FRANK GRAY, A.I.C.A.

C. G. SHUTTLEWORTH

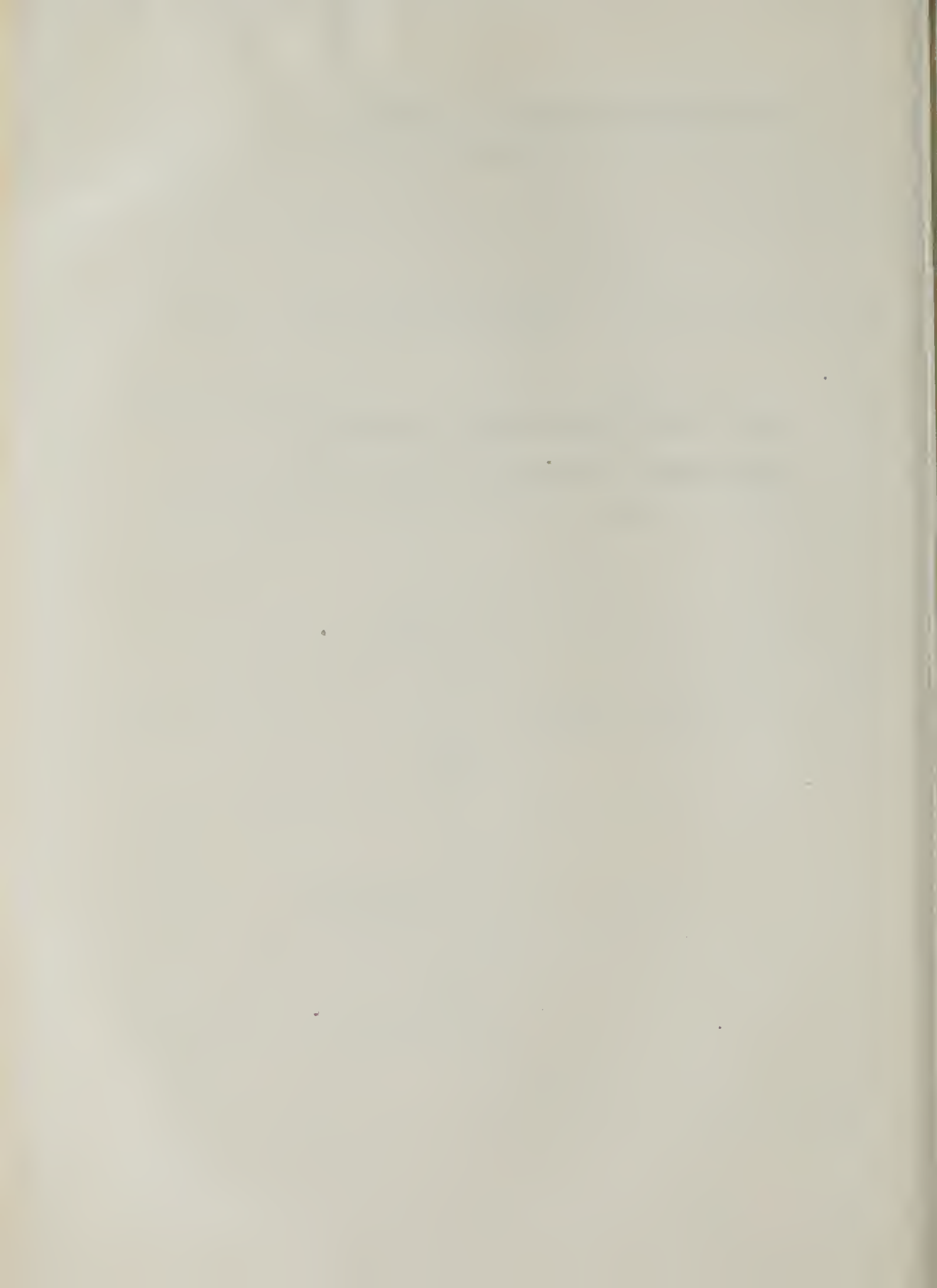
} Hon. Auditors.

The Field Naturalists' Section of the Royal Society of S.A. (Inc.)

STATEMENT OF ASSETS AND LIABILITIES, 30th JUNE, 1950

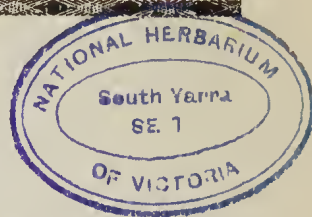
LIABILITIES				ASSETS			
	£	s.	d.		£	s.	d.
Outstanding Accounts:				Balance at Bank:			
Royal Society: Rent - £10 0 0				General Account - £175 12 2			
"Advertiser": Adver-				Life Membership			
tising - - - 1 10 0				Fund - - - 59 4 2			
		11	10 0	Coloured Plate - 10 16 3			
Balance of Assets over Liabilities -	382	16	11	Conservation Fund			
				(Belair) - - - 23 9 7			
				Conservation Fund			
				(New) - - - 2 15 3			
					271	17	5
				Cupboards - - - - - 5 0 0			
				Library - - - - - 30 0 0			
				"S.A. Naturalist" Magazines - - 50 0 0			
				Film of Toolach Wallaby - - 10 0 0			
				Badges - - - - - 9 19 6			
				Flower Show Equipment - - 1 0 0			
				Amplifier - - - - - 10 0 0			
				Canvas Shelter - - - - - 2 0 0			
				Camping Utensils - - - - - 2 10 0			
				Postage Stamps on Hand - - - 2 0 0			
					<u>£394</u>	<u>6</u>	<u>11</u>
	<u>£394</u>	<u>6</u>	<u>11</u>				

NOEL LOTHIAN, Chairman.



VOLUME 26, NUMBER 2

OCTOBER, 1951



THE SOUTH AUSTRALIAN NATURALIST

*Journal of the
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of the Royal Society of
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HON. EDITOR: W. G. BUICK, A.U.A.

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**THE FIELD NATURALISTS' SECTION
of the Royal Society of South Australia (Inc.)**

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L6533

Committee:

The President and Vice-Presidents of the Royal Society of South Australia, Miss O. Waite, Prof. J. B. Cleland, Messrs. M. Bourne, C. Engel, B. Glover, A. Gray, F. J. Miller, and R. Praite.

Contents



Grasstrees on the Adelaide Plains, *by H. A. Adams.*

Plants of the Encounter Bay district, *by J. M. Black and J. B. Cleland.*

Twining plants, *by J. B. Cleland.*

Our flora and means for its preservation, *by N. Lothian.*

Bushfires as an ecological factor in the preservation of the native flora *by E. W. Pritchard.*

Morialta Reserve excursion, *by O. M. Waite.*

Waterfall Gully excursion, *by O. M. Waite.*

A note on three rare shells from cray-pots, *by W. G. Buick.*

Book review

Statements and opinions in articles in this publication are those of the authors and are not necessarily the views of the Section.

The thanks of the Section are tendered to the authors who have generously donated articles for this issue.

Monthly meetings and Club meetings are held in the Royal Society's Rooms, Institute Building, North Terrace, Adelaide. Programmes for the year are obtainable from the Honorary Secretary.

Notes, articles and reports of excursions are requested for further issues. They should be sent to the Honorary Editor, c/o Public Library of S.A., North Terrace, Adelaide.

All communications regarding distribution, sale and back numbers should be sent to the Honorary Magazine Secretary.

Postal address of the Section is Box M 1594, G.P.O., Adelaide, South Australia.

GRASSTREES ON THE ADELAIDE PLAINS

By H. A. LINDSAY

Early paintings of scenes on the Adelaide Plains show that the grasstree (*Xanthorrhoea*) once grew along the foothills from Magill to Mitcham. As no living specimens of the grasstree can now be found in those areas, nor any signs of their existence in the shape of decayed trunks and roots, it has been thought that the artists merely included them in the background in order to give a touch of typically Australian local colour, without the existence of actual plants to serve as models, thus ignoring the fact that these plants grew only on the crests of the hills at a much higher altitude.

Evidence has now been gathered to prove that the artists portrayed what they actually saw, and that the grasstree did grow in several places on these plains. The writer's first evidence is a childhood memory. One Sunday afternoon my father, the late George Lindsay, took me for a walk and we called to see the late John Godden, of Hawthorn, who worked a sand and gravel pit on the banks of Brownhill Creek. A discussion began concerning what that portion of the Adelaide Plains had looked like in the early days, and I have a clear memory of Godden saying, "All those old blackboy trees have gone now—there used to be a big clump of them up at Mitcham."

On its own, that could be regarded as very indirect and untrustworthy evidence, but in 1920 the writer saw several stumps of grass-trees uncovered when a sandhill at Findon was being levelled for the building of a house. Even this is open to doubt; the stumps could have been carted there with a load of firewood, but the thing which settles all arguments is the fact that grass-trees are still growing on the plains and can be seen by anyone who visits the locality where they are found.

Lying to the north-west of Gawler, midway between Roseworthy and Two Wells, is an area of sand dunes which appears to be a scientifically interesting survival area. Members of my club, Adelaide Bush Walkers, visited these sandhills on several occasions three years ago; we were searching for aboriginal campsites at the time and we found many of them where erosion had laid bare the limestone bedrock. Several hundred-weights of artifacts, including over sixty Pirri points, were gathered and taken to the South Australian Museum. A goanna nearly three feet in length—it could not be secured for identification as it escaped down a rabbit burrow—was seen, together with the tracks of some small marsupial of the rat kangaroo type.

Where erosion and rabbits have not denuded the dunes of vegetation, many species of plants not seen elsewhere on the plains, as far as the writer's knowledge goes, are found in this area, including at least one clump of *Xanthorrhoea*. No other grass-trees can now be found nearer than the summits of the hills to the southward of Sandy Creek.

Speaking from an admittedly scanty knowledge of botany, but with the assurance of a hushman who does his best to be an accurate observer, the writer states that this area of sand dunes, apparently unknown to our hotanists, offers a promising field for study and perhaps a chance to secure one portion of them, which would merely drift away if cleared, for a flora reserve. No good land would be kept out of production if this was done; if surrounded by a rabbit-proof fence and, the most important point of all, if that fence was kept in order, we could preserve there a collection of the original flora of the sandhill country of the Adelaide Plains.

PLANTS OF THE ENCOUNTER BAY DISTRICT

Sixth List of Additional Records

By J. M. BLACK and J. B. CLELAND

We published a fifth list of additional records in the "South Australian Naturalist" for May 31, 1941 (Vol. 21, No. 1, p. 15). With the additions in this list, the number of species now recorded for this district, extending from the road to Tunkalilla Beach on the west to Currency Creek on the east and embracing the catchment areas of the human and Hindmarsh Rivers, is 918 together with 21 varieties in addition, of which 705 species and 18 varieties in addition are native plants and 243 species and three varieties in addition are introduced.

To show how rich the flora is, 128 species of vascular plants were noted in flower in Upper Hindmarsh Valley alone, on the occasion of the Field Naturalists' visit there on October 10, 1949.

* Indicates an introduced species.

Salviniaceae

Azolla filiculoides var *rubra*, Murray at Goolwa.

Potamogetonaceae

Posidonia australis already recorded. Very large numbers of fruits, mostly split, were washed ashore at Encounter Bay between Jan. 6 and 12, 1948, so that the shore in places had quite a yellowish green tinge. At Esperance, W. Australia, in the middle of September, 1950, the broad-leaved form in flower (stamens) was washed up in abundance.

Potamogeton crispus, Murray at Goolwa.

Gramineae

Aristida Behriana, near Currency Creek, Jan.

Page Twenty-four

Stipa Muelleri, Hindmarsh Tiers in Stringybark country.

S. elegantissima, near Currency Creek.

S. plagiopogon, Victor Harbour, Inman Valley, in Black, 2nd Edition.

Sporobolus capensis, already recorded as *S. indicus*, also common at Victor Harbour, etc.

Agrostis aemula, Inman Valley.

* *Avena sativa*, Cultivated Oat, spontaneous.

* *Cynosurus echinatus* (not *Echinopogon ovatus*), Hindmarsh Valley, etc.

Schismus barbatus, Aug. 17, 1947.

* *Puccinellia distans*, colonising silty sand at the Inman Mouth.

P. stricta, already recorded, is growing on spray-exposed cliffs at the Bluff.

* *Vulpia Myuros*, Rat's-tail Fescue.

* *Bromus hordeaceus* as well as *B. mollis*, already recorded.

Chloris truncata, on bank at junction of Currency Creek and Murray.

Lepturus cylindricus, Inman Mouth.

* *Pholurus incurvus*, should be deleted until confirmed.

Cyperaceae

Scirpus americanus, already recorded. Goolwa.

S. littoralis, Murray R. near the Barrage, Jan. 1951.

Carex breviculmis, Waitpinga, the Bluff (Aug. 22).

* Araceae

* *Zantedeschia aethiopica*, Arum Lily, spontaneous in upper part of Inman Valley.

Centrolepidaceae

Centrolepis aristata.

Juncaceae

Juncus bufonius var. *fasciculatus*.

**J. tenuis*, in Black's Flora. Pt. 1. 2nd Ed.
J. vaginatus.

Liliaceae

**Asparagus officinalis*. Edible Asparagus.
already recorded. Hindmarsh Valley.

Lomandra densiflora (not *L. filiformis*).

L. fibrata (not *L. caecopitosa*).

L. juncea, already recorded, Goolwa.

Thysanotus dichotomus, already recorded,
is correct.

Th. tuberosus, in Black. 2nd Edition, being
an error. The rootstock is swollen at
the base.

Xanthorrhoea semiplana—*Tateana*. These
species run into each other. In Wait-
pinga many have stems several feet long
and sometimes branched. One spathe
measured 6 ft. 8 in. (2 m.) long x 4 in.
(10 cm.) thick at the base; the spike 11
ft. (3.3 m.) x 2 in. (5 cm.) at the tip.

**Allium Scorodoprasum*, recorded in error
as *A. vineale* and in Black, 2nd Edition,
Inman mouth, well established.

**A. Ampeloprasum*, Wild Leek, not *A.*
rotundum, recorded in error.

Iridaceae

**Iris germanica*, German Iris.

**Moraea Xerospatha* var. *monophylla*.

**Homeria* sp. In January, 1942, I was in-
formed that Cape Tulip had appeared
on the Inman Road and that the District
Council of Encounter Bay had tried to
eradicate it.

Orchidaceae

Gastrodia sesamoides. Inman Valley in
Black, 2nd Edition. Pt. II.

Calochilus paludosus, Willow Creek in
Black, 2nd Edition. Pt. II.

Caladenia Fitzgeraldii, in Black, 2nd Ed.,
Pt. II.

Casuarinaceae

Casuarina paludosa var. *robusta*, already
recorded: Miss Macklin's localities are
Upper Hindmarsh Valley and Inman
Hills.

Urticaceae

Urtica incisa, Goolwa, Feb. 10, 1949.

Santalaceae

Exocarpus sparteus, already recorded. The
fleshy pedicels are rosy red or pinkish
red, not white or yellowish, ovoid. 8 x
5 mm., near Goolwa.

E. aphyllus. In the 4th List of Additions,
this was noted as probably an error, but
Mr. J. M. Black has identified a speci-
men. Another specimen (August 30,
1924) was identified by him as *E.*
strictus but near *E. aphyllus*.

Loranthaceae

Loranthus Preissii on *Acacia dodonaeifolia*
and a dead Loranth, probably the same,
on adjacent *A. pycnantha*, Currency
Creek, Jan. *L. pendulus*, *L. Miquelii*,
and *L. Exocarpi* growing on the latter,
were all on one tree of *Encalyptus leu-
coxylon* at Hall's Creek, January, 1944.
L. pendulus on *E. ovata*, Back Valley,
January, 1945. *L. Exocarpi* on orange
(*Citrus aurantium*), Hindmarsh River.

Polygonaceae

Rumex dumosus, amongst rocks. Bluff.

**R. obtusifolius*, bank of Murray at Goolwa.

Chenopodiaceae

Rhagodia nutans, already recorded, fruits
yellow, Victor Harbour, May, 1941.

Chenopodium anthelminthicum, delete,
mistaken diagnosis.

Atriplex hastata var. *salina*, probably, not
in flower, Goolwa.

Aizoaceae

Carpobrotus acquilaterus, replaces *Mesem-
brianthemum acquilaterale*.

C. edulis, planted at Encounter Bay.

Disphyma australe, replaces *M. australe*.

Caryophyllaceae

Silene Cucubulus, Encounter Bay.

S. Schafta, Victor Harbour in Black, 2nd
Edition, Pt. II.

Papaveraceae

**Fumaria capreolata*, Victor Harbour, Aug.

Cruciferae

- **Brassica Tournefortii*, Encounter Bay, May 1947; Victor Harbour.
- **Alyssum* sp., at Port Elliot is *A. maritimum*.
- **Cakile edentula* with an unhorned lower article occurs as well as *C. maritima*. but the two seem to grade into each other. The flowers are only slightly fragrant.

Rcsedaceae

- **Rcseda alba*, Victor Harbour, Jan. 11, 1948.

Crassulaccae

- Crassula bonariensis* and *C. recurva*, both already recorded, Murray at Goolwa.

Rosaceae

- **Crataegus monogyna*, Hawthorn.

Leguminosae

- Acacia microcarpa*, already recorded, Adelaide Road, near Goolwa; on ridge just behind Victor Harbour (with longer phyllodes).
- **Cytisus canariensis*, already recorded, Inman Valley, Hindmarsh Valley.
- **Trifolium resupinatum*, only recorded from the South-East, should be deleted.
- **T. tomentosum*, Encounter Bay.
- **Trigonella ornithopodioides*, Encounter Bay in Black, 2nd Edition.
- **Melilotus alba*, Bokhara Clover, already recorded. In January, 1944, several plants about six feet high were round growing together near the Inman mouth. On the night air, the fragrance could be detected on the shore a hundred yards or so away.
- **Medicago sativa*, Lucerne, already recorded. Close to the *Melilotus alba* was a lucerne plant with pale yellow flowers and further away dark blue and pale blue lucernes with others with normally coloured flowers, suggesting the possibility of crossing. Both **M. tribuloides* and **M. truncatula* occur.
- **M. lappacca*, Bluff.
- **M. arabica*, Hindmarsh Valley. Nov.

- **Lotus corniculatus*, Hall's Creek.

- **Vicia calcarata*, Encounter Bay, Aug. 17, 1947.

- **Lathyrus latifolius*, Hall's Creek.

Glycine Latrobiana, in pod, Hindmarsh Valley. January, 1947; in flower Nov., 1950.

Psoralea patens, already recorded, in scrub near the Air Force establishment in Victor Harbour itself, Jan. 27, 1948.

Geraniaceae

Erodium cygnorum, already recorded, on the Bluff and abundant on partly cleared land towards Waitpinga, Aug.

Pelargonium inodorum, replaces *P. australe* var. *erodioides*, the inland species.

Oxalidaceae

- **Oxalis variabilis* for *O. sp.* (One O'Clock), near Cemetery, Victor Harbour, May.

Polygalaceae

- **Polygala myrtifolia*, near Cemetery, Victor Harbour, May.

Euphorbiaceae

Phyllanthus Tatei, replaces *Micrantheum Tatei*.

Rhamnaceae

- **Rhamnus Alaternus*, Buckthorn. Goolwa. Victor Harbour.

Sterculiaceae

Thomasia petalocalyx, already recorded. Back Valley.

Guttiferae

Hypericum perforatum, already recorded. several plants on the Inman Valley road on the first hill just beyond the Porter tablet. Also near the Bluff.

Thymelaeaceae

Pimelea stricta, Goolwa-Currency Creek railway line.

P. humilis, Hindmarsh Valley, Nov.

Myrtaceae

Melaleuca uncinata, already recorded, Victor Harbour.

M. fasciculiflora, already recorded, in Currency Creek at the railway bridge.
Eucalyptus viminalis, already recorded, may have as many as 6 flowers in the umbel and is evidently *E. Huberiana*.
E. incrassata, near Goolwa.

Umbelliferae

Centella asiatica, already recorded, Currency Creek, Jan.
Hydrocotyle vulgaris, Murray at Goolwa, 6/1/51.
Lilaeopsis australica, Murray at Goolwa, 6/1/51.
Eryngium rostratum, on the Bald Hills, January, 1945. Specimens previously collected here were referred to *E. Vesiculosum*. The latter species occurs in or near dry watercourses in Back Valley and at Hindmarsh Tiers, whereas *E. rostratum* is found in dry places such as the tops of grassy hills.

**Conium maculatum*, Hemlock, rubbish-tip, Victor Harbour, May.

Plumbaginaceae

**Statice ninnata*, near Victor Harbour, Jan. 27, 1948.

Loganiaceae

Logania recurva, Waitpinga, Jan., 1947.

Gentianaceae

**Erythraea maritima*, road to Hall's Creek, Oct. 29, 1934; Upper Hindmarsh River, Nov. 10, 1950.

Convolvulaceae

Calystegia sepium, Murray at Goolwa, 6/1/51.

Borraginaceae

Myosotis australis, Hindmarsh Tiers, Nov.

Verbenaceae

**Lippia canescens*, Port Elliot, Victor Harbour.

Labiatae

Ajuga australis, Upper Hindmarsh Valley, Oct. 10, 1949.

**Lavendula Stoechas*, already recorded. In January, 1942, a patch was noted on the first hill on the Luman Road and in January, 1945, another by the ford on the opposite side of the river.

**L. dentata*, near Currency Creek, Jan. 8, 1948.

Brunella vulgaris, Self-heal, Hindmarsh Tiers, Jan., 1951.

**Nepeta Cataria*, in bed of Hindmarsh River, Jan., 1947.

Scrophulariaceae

Linaria Elatine, is var. *lasiopoda*.

Rubiaceae

Opercularia scabrida, Victor Harbour.

Compositae

Eclipta platyglossa, Feb.

Erechtites prenanthoides, should be deleted being only recorded for the South-East.

Senecio brachyglossus var. *major*, sea-cliff at the Bluff, August, 1935.

**S. scandens* DC. (*S. Mikanooides Otto*), Cape Ivy, Upper Hindmarsh Valley.

**Soliva sessilis*, Upper Hindmarsh Valley, October.

**Osteospermum moniliferum*, Currency Creek railway bridge; seafront, Port Elliot.

**Arctotis stoechadifolia*.

Cassinia laevis, should be deleted until confirmed.

Helichrysum rutidolepis, already recorded. Back Valley, growing through under-shrubs.

H. densifolium (*H. obtusifolium* var. *tephrodes*), Cape Jervis road near Encounter Bay, Jan. 24, 1948.

Lactuca Scariola, Prickly Lettuce, Goolwa Barrage.

TWINING PLANTS

By J. B. CLELAND

Looked at from above, a twining plant may ascend clockwise or anti-clockwise. Or looked at from the front of its support, it may ascend by passing in front from right to left (clockwise), or left to right (anti-clockwise).

Charles Darwin, in "The Movements and Habits of Climbing Plants," 1876, says:—"A greater number of twiners revolve in a course opposed to that of the sun, or to the hands of a watch, than in the reversed course . . . and ascend their supports from left to right." (P. 33.)

Darwin here makes the mistake of referring to the course of the sun. In the Northern Hemisphere (to which Darwin of course refers), if we take a runner bean (which twines anti-clockwise) on its support (a long pole) and look at the sun, the sun passes behind the pole from left to right but the bean passed *behind* from right to left (the sun moving south as it ascends). In the Southern Hemisphere, the sun moves north and so passes *behind* the pole from right to left, just as the twining bean does here. This seems an extraordinary mistake for Darwin to have made but he repeats it again and again on pages 24 to 31, referring to plants as moving against the sun or following the sun. Had he stuck to the hands of a watch, there would have been no ambiguity.

Rain and Barkhill, in "Annals of Roy. Bot. Gardens, Calcutta," XV Pt. 1., discuss the genus *Dioscorea* (true yams). The article deals with the species of this genus that occur in the East. Pt. 1 embraces those species *which twine to the left* (that is clockwise). Presumably Part II deals with species that twine to the right. In Pt. 1, two species at least *cross the line*. If the twining follows the sun, what is the poor plant to do in the tropics, particularly at the equator?

At first I failed to realise that Darwin, in speaking of "climbing plants," meant those whose stems or branches ascend their support spirally and did not under this heading include plants with tendrils such as the vine, passion-fruit and pumpkin. The latter he deals with in Chapters 3 and 4 under the heading of "Tendril-Bearers." Darwin notes that some tendrils may reverse the direction of the twist and may do so several times. The four species of tendril-bearers in my garden show that the twining on the same plant may be clockwise or anti-clockwise and that reversal of twist may occur. The following results were noted:—

Grape vine.—Anti-clockwise 11, clockwise 5, anti-clockwise and then clockwise 1. In a bifid tendril clasping a straw, one branch twisted one way and the other the reverse.

Ordinary Passion-fruit. — Anti-clockwise 15, clockwise 10.

Banana Passion-fruit.—Anti-clockwise 10, clockwise 10, clockwise then anti-clockwise 1.

Triamble (Pumpkin).—The tendril has three branches, two of which may twist in the same direction and the other in the reverse. In one case, the central branch went clockwise below, then anti-clockwise, becoming bent back and turning round itself. Of six other tendril branches noted, three went one way and three the other.

A colony of the Native Lilac (*Hardenbergia violacea*) near the Cherry Plantation in the National Park, all show an anti-clockwise spiral of the twining stems. So far, I have not had the opportunity of observing other twining plants, especially native ones, but will make other observations when the chances occur.

OUR FLORA AND MEANS FOR ITS PRESERVATION

By NOEL LOTHIAN

(Summary of Annual Address, July 17)

Of the many subjects which are freely discussed today, the question of the preservation of our natural vegetation is one which commands considerable attention. It is not surprising, therefore, that even the man in the street is now aware that some action should be taken to not only preserve our native plants *per se*, but because of the important part such plants play in our national economy which is best understood by soil erosion. Therefore we should give some consideration to ways and means of preserving our natural vegetation as it stands or, if this is not possible, then to the artificial preservation of living specimens by cultivating such plants in our gardens.

It is noteworthy that the first positive action to protect our flora was made by a member of this Section—Mr. A. F. Robin—in a paper on August 21, 1888. This commencement was made with regard to setting aside sanctuaries and reservations while the fate of the area now known as National Park was still in the balance. In 1881 it was proposed to sell this Government farm of approximately 2,000 acres situated near Belair, but fortunately Parliament passed an Act in 1883 prohibiting this; while it was not until 1891 that some of the early stalwarts of this Section whipped up public opinion and thus Parliament passed an Act forming the National Park.

The next major reservation to be carried out was that on Kangaroo Island. By this time the Fauna and Flora Protection Committee (of the Field Naturalist Section) was

determined to have reserved a large portion of the west end of the Island. It was not until 1919, however, that an Act "to establish a reserve on Kangaroo Island" was passed. This is one of the few reserves in Australia which is entirely free of both rabbits and foxes.

Mr. N. J. McGilp has very clearly stated in his outstanding article in the S.A. Naturalist (Vol. 25 Nos. 2 to 4) 1950, the details concerning early work which was carried out to have these reserves established, the functions of the various bodies to control the reserves and, finally, a list of reserves and sanctuaries. These sanctuaries, all of which are declared under the Animal and Bird Protection Act, are "under the control of the Department of Agriculture but there does not appear to be any protection of the flora of these sanctuaries." Surely this is a most astounding position, for how can an area be a bird sanctuary if the natural vegetation has been removed? In many instances our native birds rely entirely on the native vegetation, therefore while these reserves may protect the fauna they do nothing to protect the natural vegetation.

Today there are three main bodies set up under various Acts to deal with the protection of the flora and fauna. Firstly, we have the Flora and Fauna Board of South Australia which apparently can deal only with Flinders Chase on Kangaroo Island. Then we have a Flora and Fauna Advisory Committee which is a body set up to give advice to the Government; they have no financial backing and

their whole function is advisory. Thirdly, we have the Commissioners of National Park, their function being to manage the National Park only.

In addition to the above reserves, there are areas set aside by the Government which are managed and controlled by the Forest Department and again by the Engineering and Water Supply Department. These areas are reserves in name only as in each case planting with an exotic Conifer ultimately takes place. Finally, there are private reserves which, of course, are extremely unstable with the notable exception of the reserve at Humberg Scrub, held by the Bellchambers family. This reserve, because of the establishment of a family trust, will be held in perpetuity.

Thus we see there are considerable reserves held by the Crown to insure that areas of our natural vegetation are held for all time. Even where clearing is carried out and, thanks to the hard work of Mr. J. N. McGilp, 10 per cent. of land now cleared must be reserved by the Crown in its natural state. Where it is possible for such areas to be held in the corners (where fences are common between different holdings) such a reserve is a notable contribution to areas in which both our Fauna and Flora can be protected.

However, the protection as given is by no means sufficient for it in no way takes into account species of local, sporadic or limited distribution, and plants which have such distribution are today more likely to disappear forever than those widely distributed. This then brings me to the second means of preserving out native plants.

The cultivation of Australian plants dates from the first collection taken back on the voyages of Dampier and, considerably later, of Cook. It is interesting to read contemporary scientific literature and note the enthusiasm and mild hysteria which developed amongst the cultivators of rare plants when representatives of Australian vegetation first reached England. For many years South African plants had been cultivated and had established themselves, and their beauty and interesting characteristics drew attention

everywhere. Into this field came many spectacular Eastern Australian plants, notably *Correa*, *Epacris*, *Isopogon*, *Grevillea* and many others. It is only within recent times that we have overcome our many objections to our own plants and we are now cultivating the more brilliantly flowered and attractive of them.

With what peculiar methods of cultivation we persist! It is clearly another instance of our horticultural practices not falling into line with the scientific horticultural practices which are known elsewhere.

Australia, by and large, is known as a dry, desolate, sandy, scorched waste and consequently we tend to treat all our Australian plants when they enter our gardens as inhabiting such areas. We would not think of placing choice and treasured garden subjects in harsh or unfavourable positions merely because certain areas of their natural country represent these conditions. We acknowledge the differences between north western America and the climates found in the central western and Texas and towards the Mexican border, and yet a completely analogous case in Australia is by and large ignored. Therefore the first step in the proper cultivation of our plants must be to give them the correct requirements.

My main and in fact my only purpose in emphasising the cultivation of Australian plants is to insure that many rare and locally found species will be perpetuated in our home gardens and there remain for all time. In this way while, in years to come, we may not be able to show our own children or visitors these plants in their natural surroundings we can at least show them the plants. Too many cases can be quoted today where plants have either already ceased to exist entirely and are not to be found under cultivation or that they are on their way out. It is not too late with those of the latter to insure their propagation: with the former, one can only lament that they are no longer to be seen.

It is true that many of these plants may have only botanical significance therefore, obviously, it is the duty of scientific institutions to cultivate these (such as is being

carried out at the Adelaide Botanic Garden) but where the plant is horticulturally beautiful all lovers of our native vegetation should take active steps to insure that such plants are grown.

Many hold blocks of land and after establishing a holiday home proceed to plant representatives of our native plants. In doing so, care must be taken to make certain that representatives of the existing vegetation are preserved otherwise they in turn may become amongst our rarities.

Of the cultivation of native plants, the only sound instruction given has been that which states, "they are not to be dug around or interfered with." Such a statement, of course, is applicable to all woody subjects and to enforce it, mulches of compost, sawdust and other organic material including strawy stable manure should be used. I do not subscribe to the much voiced theory that Australian plants should not be manured. Some time ago, when reviewing a publication dealing with American shrubs, one came across a statement which rang familiar, "on no account should manure in any form be given to our 'American' trees and shrubs, but merely mulch with leaf mould, compost and other materials." This practice of not manuring Australian plants no doubt has arisen from happenings occurring in England where, possibly, some potent mixture meant for green house plants was inadvertently given to Australian plants under cultivation. Naturally these plants succumbed and thus, I suspect, from such an action the myth arose. Perhaps Loudon, that all embracing and most careful horticultural writer of the early 19th century, may have unwittingly originated this story.

Experiments which have been carried out by the Adelaide Botanic Garden and in conjunction with Mr. J. G. Kelly and Son at Giles Corner, indicate the help in establishing Australian plants when one handful of superphosphate has been applied to the ground either immediately before or after planting. With legumes the establishment rate has been almost 100 per cent. and the subsequent growth excellent. In addition, these plants have received dressings of old stack bottom and sawdust and yet it is doubtful if this influence has caused one death

amongst the Australian material planted in this experimental block. I would suggest to each who is interested in the cultivation of our plants to manure them in the same way as we manure our other garden plants, namely, in moderation or little and often. In some experiments carried out privately, I have found neither blood and bone nor sulphate of ammonia is in any way harmful, in fact, sulphate of ammonia and sulphate of iron (3:1) at 1 ounce per square yard in monthly dressings has improved the vigour and appearance of Australian plants cultivated on the Adelaide plains.

The question of mulching with materials other than organic matter should not be overlooked, and in Melbourne, Mr. Ivor Hammet, some years ago, applied a deep mulch (2 in. to 3 in.) of small path gravel to all his beds. The results were astonishing; not only did the plants respond, and of course there was no consolidating of the soil, but the seeds produced fell, were washed down amongst the gravel and germinated in profusion; rare and common plants were reared in the same way. In South Australia, and in Adelaide especially, protection to the soil from the intense summer sun is a first requirement in the cultivation of any plant. Mulching with sawdust or organic matter, decomposed manure capped with gravel will conserve moisture it is true, but I feel what is more important it will reduce the soil temperature and add essential plant foods to the soil. That the roots of native plants penetrate sawdust after it has become decomposed can be seen by anyone who has ever visited a saw mill dump heap.

I have endeavoured to draw attention to the various ways in which plants can be protected. We must, however, reserve much needed tracts of land so that the plant associations remain intact or, failing that, reserve sufficient to insure the protection of rare or locally distributed plants. If these two measures fail, or to supplement these measures, we should actively cultivate the individual plants themselves for in these ways only will it be possible for us to perpetuate the existing species. To do otherwise will surely reap the condemnation of all in a few generations.

BUSH FIRES AS AN ECOLOGICAL FACTOR IN THE PRESERVATION OF THE NATIVE FLORA

By **EDGAR W. PRITCHARD**

After the disastrous bush fires of last summer, there appeared in the daily press a good deal of discussion on methods of dealing with them when they occur; but few suggestions on how to prevent them altogether. This, of course, is the real problem, and the following is a contribution to that end.

WHAT IS ECOLOGY?

Let us look first at the scientific aspect. Ecology is that branch of science which deals with the relation of plants to their environment, the environment consisting chiefly of the climate and the soil. To show that each environment produces a different type of plant it is only necessary to compare the flora of the sea shore, the Mount Lofty Range and the salt bush country.

OUR SCLEROPHYLL FOREST

But besides the soil and the climate there are other minor factors which influence the floral type of any particular area. And in the sclerophyll (hard leaf) forest of the Mt. Lofty Range, with its wet winter and dry summer, one of them is the periodical bush fire.

BUSH FIRES PERENNIAL

Now it is practically certain that this area has been burnt over frequently for hundreds of years. This is proved by the want of humus in the soil. Good soils are formed by the decay of grass or leaves, sticks and bark. In moist climates, where there are no forest fires, the vegetable debris covering the soil may be six feet and more deep.

This gradually decays, and is worked into the soil by beetles and worms, and forms the dark brown humus, which is so essential for high fertility. I have observed one case under red gum trees, in which three inches of debris accumulated in ten years, which means 30 inches in 100 years, as well as some black top soil. The only reason why there is practically no humus in the sclerophyll forest soil is that the frequent bush fires destroy all the humus forming materials. It is true also that these soils are deficient in mineral plant foods, such as phosphates of lime, but this is due to the high rainfall. But on the other hand humus helps to hold these minerals in the soil.

COMPLETE DESTRUCTION

Each bush fire burns up all the refuse on the surface, leaving behind little organic matter but charcoal. Then the winter rains come, and wash even this away into the gullies and out to sea. The reason why the gullies are more fertile is because they contain more moisture, and so are not burnt out so completely. So it appears that the sclerophyll forest of our Mt. Lofty Range must have been burnt over periodically for very many years. Their starting was probably due to the aborigines lighting the underbrush to drive out the game, as is still done in the northern interior.

FIRE RESISTANT TYPES OF PLANTS

And here ecology comes in again. This periodical burning off has become part of the conditions, the environment, in which the

plants live. This is proved by the ability of this whole association of plants to survive a bush fire every few years, as shown by the wonderful regeneration after the most severe conflagration.

Each species has its own means of survival. There are four main methods by which this is brought about. The first is by protective devices such as the thick, rough outer bark of the stringy bark trees; the second is by thick root-stocks as with the tea-trees; the third is by bulbs as with the orchids, and the fourth is by seeds, e.g., the heath. Thus every plant in the association has one or more methods by which it can survive bush fires; for the first three classes can be regenerated also by seed. It is a notable fact that the plants, which are protected by root stocks, produce fewer seedlings than those which are completely destroyed. The following table is the result of a count made on the ridge between Candy's Gully and Horsnell's Gully two years after a fire.

PROPORTION OF SEEDLINGS TO OLD PLANTS

	Seedlings	Old plants	Root stock
<i>Epacris impressa</i>	Miriads	0	0
<i>Daviesia corymbosa</i> -	Miriads	0	0
<i>Tetratheca pilosa</i> - -	10	1	Small
<i>Grevillea lavandulacea</i>	4	1	Small
<i>Pultenaea daphnoides</i> -	2	1	Large
<i>Hakea rostrata</i> - - -	1	1	Large

PRESERVING THE ECOLOGICAL CONDITIONS

What then are the practical conclusions from these facts in regard to the preservation of the native flora in the Mt. Lofty Range and other similar ecological associations. First and foremost that since each species has developed its present characteristics through its present environment, the main essential for their preservation is to maintain the same conditions in the future, including the periodical bushfire.

THE ECOLOGICAL CLIMAX

But there is another reason for this treatment. For ecological purposes the vegeta-

tion in this particular association of plants is divided into three parts. First there are the trees overhead, second the shrubs and third the grasses and rushes and herbaceous plants. When this whole vegetative association reaches its climax we have the trees above and below a dense mass of shrubs three to four feet high with very few herbaceous plants or seedlings.

THE SURVIVAL OF THE HERBACIOUS PLANTS

If this condition were allowed to continue, it seems highly probable that the small under plants, including the orchids, and the liliaceous and many of the compositous plants would be exterminated. But after the cleansing fire has passed through all these lowly plants spring up and flower, and provide another store of seed for the future to lie dormant until the next fire awakes them into life again. This is seen by the wonderful crop of these basal plants after the fire in the locality mentioned above with the orchid *Diuris longifolia*, for instance, up to sixty to the square yard, and twenty seedlings to the square foot. There are some orchids which flower only after a bushfire.

A PRACTICAL SCHEME

The best practical plan then for managing these areas appears to be to deliberately burn off the scrub every few years with proper precautions against it spreading to settled areas. If this were done early, when there is no chance of the fire getting out of control, the fire hazard, which causes so much anxiety and fear, would be removed. And further, it would not produce such a clean burn, so that some rubbish would be left on the surface to prevent erosion. This appears to be the method used by the aborigines, for a forest fire in mid-summer would have been much too dangerous to themselves.

INTRODUCED WEEDS

It has been said that burning off the scrub gives a chance for introduced plants to become established and kill out the native ones. This happens in the sclerophyll forest only

when domestic animals are allowed to eat off the young shoots and seedlings while in the soft, tender stage. On the other hand there is considerable evidence to show that after such land has been cultivated, and then abandoned, the native flora has gradually taken possession again. This is probably because the introduced species cannot grow on such poor soils without fertilisation.

CONCLUSION

To sum up: If this plan were carried out systematically it appears that we would kill four birds with one stone. We would preserve the whole of the native flora, we would prevent the harmful effects of bushfires, we would stop erosion, and we would also give the native animals a better chance to escape from the fires.

MORIALTA RESERVE EXCURSION

MAY 19, 1951

By O. M. WAITE

A fine day enticed a larger number of members than usual to join the party on a five or six mile walk in the Torrens Gorge. They were reminded that on the first visit of the Field Naturalists to the area on 3rd April, 1886, it was known as Glen Stuart, and the Section paid 2/6 for the privilege of going over the estate, then privately owned, and taking specimens on condition that the sheep were not disturbed.

Passing the savannah woodlands on the low foothills, the party ascended the path near the Kiosk, which leads up Reade Gully and along the hillsides to the second fall. On the way many she-oaks (*Casurina stricta*) were noticed, on some of which the mistletoe (*Loranthus Exocarpi*) was seen growing. The cotton bush (*Asclepias rotundifolia*), the feeding plant of the Wanderer butterfly, grew in abundance. A few of the butterflies and their caterpillars were seen. *Acacia rupicola* made a green bank on either side of the path at one place. The coppery tips of the new growth were of interest. A natural scree on the hillside to the right of the track was topped by numerous plants of

Aanthorrhoea quadrangulata in grotesque shapes.

Plants in flower growing along the way were *Olearia tubiliflora*, *Kennedya prostrata*, *Astroloma conostephioides* and *Correa rubra*.

At the second fall billy-tea was enjoyed. In the vicinity grew *Leptospermum pubescens*, *Callistemma purpurea* and *Cheilanthes tenuifolia*. The walk was continued on the northern hillside, known as Hikers' Hill. Many bushes of the lovely *Anthocercis angustifolia* were seen. Once rare, this plant now grows abundantly in the Reserve. Other plants noted were *Banksia marginata*, *Hybanthus floribundus*, *Spyridium spathulatum* and *Epacris impressa* in shades of red, pink and white.

Among the birds observed were robins (*Petroica multicolor*), yellow-winged honey-eaters (*Meliornis novae-hollandiae*) and Sydney waxbills (*Aegintha temporalis*) pecking at the small, hard cones of she-oaks.

A male specimen of the trap-door spider (*Missulena occatoria*), whose bite can be serious, was found in a comatose state.

Report of Motor Bus Excursion to Waterfall Gully on November 4, 1950

By O. D. WAITE

Leaving Choat's bus at the Waterfall Gully Look-out, members walked about one hundred yards along the Mount Barker Road, to a track which winds its way along the hill-sides and down to the Waterfall Gully Reserve. It was late spring, and though there are usually some surprises in the Gully, members were not quite prepared for the sight that met their gaze. The track, which is very good for a considerable distance, leads back at first to near the foot of Mount Lofty Summit, the vicinity of serious bushfires in the previous summer. The fires had descended to the gully and for a distance of about a mile and a half had burnt out the undergrowth, large shrubs and small trees, leaving the wild-flowers to flourish and to flower riotously. There was a mass of colour for as far as one could see along the gully. Predominant was the pale mauve of *Diehopogon strictus* with its loose racemes of delicate flowers, on long pedicels, waving gracefully in the breeze. Intermingled was *Burchardia umbellata* with erect stems and umbels of large white flowers. *Stylidium gramineifolium* was there with spikes of pink and white flowers. Members were shown the interesting movement of the column, from which movement this plant gets the common name of "trigger plant." *Spyridium*, *Hibbertia*, *Senecio* and *Olearia grandiflora* made a great display. Eight varieties of orchids were noted, the interesting and rare *Thelymitra fuscolutea* being among the number, but as the sky was overcast, this orchid was not seen to full advantage as it only shows its speckled beauty in full sunshine. A large clump of *Lyperanthus nigricans* was seen.

This orchid spends much of its life underground, seeming only to appear after a fire. The flowers had all dried black. On the banks of the little stream which runs through the gully, the blue native iris (*Patersonia glauca*) was flowering. The sloping banks of the stream were lined with maiden hair fern (*Adiantum aethiopicum*).

Near the tops of the hills bordering the gully there were fine specimens of *Xanthorrhoea semi-plana*. No doubt the area visited will again be covered with shrubs and small trees as fire is favourable to the seeding of many of the native plants, particularly *Leptospermum*, *Hakea rostrata* and *H. ulicina* as they have hard, woolly foliicles which split after the application of heat.

A number of members who had travelled up from Burnside were met along the way and the whole party assembled at the picturesque vicinity of the Second Fall to examine and discuss specimens.

At the top of the Second Fall there were some fine plants of *Blechnum capense* and coral fern (*Gleichenia circinata*). The return journey was made along the main Waterfall Gully Road. Some hardy and adventurous spirits left the main road and took the track constructed by Sir Samuel Davenport many years ago. From the hillsides along the track, wonderful panoramas are gained of the surrounding hills and countryside. A little valley was crossed which should be pretty at any time of the year, dotted as it is with hawthorn hedges. The track comes out at Beaumont, within sight of the Burnside tram terminus.

THREE RARE SHELLS FROM CRAY-POTS

By W. G. BUICK

It is worth recording that Mr. J. J. Turnbull has recently obtained two specimens of one of our rarest shells, *Altivasum flindersi*, from Mr. Ritter, who collected them from cray-pots submerged out from Corny Point. Only 10 specimens have been recorded previously. (See South Australian Naturalist, 24-1, 13 (Sept., 1946)), and as one of the present specimens is larger than any of these its dimensions are given here: Length, 145 mm.; width, 88 mm. It is a perfect specimen and, while not taken alive, it had obviously not been dead long. In colour it is a rich apricot shade with subsidiary green which appears to be a natural colour of the shell and not due to superficial algal growth. A thickly crenulated golden periostracum, or skin, is present in places on the exterior.

The other specimen, from the same locality,

is one of our volutes, *Cottonia dannevigii*. Very few specimens are known. This one is typical, having a uniformly deep orange colour except for a single pale narrow spiral band. This volute differs from the other South Australian members of the family by its very large globular protoconch, or embryonic shell. As far as is known all specimens of this shell in collections have no protoconch. It has been suggested that this is deciduous. This new specimen also has the protoconch missing but, although the uppermost whorl has been sealed with shelly material by the animal, it appears that the protoconch has been destroyed by accident rather than by any process in the life cycle of the animal. Enough of it remains to indicate the size and shape and that the nucleus is lateral.

BOOK REVIEW

Collecting Butterflies and Moths

By IAN HARMAN

Our copy is from the publishers, Williams and Norgate. Price, 7/6. It has been placed in the Section's library.

This is an admirable book for young British collectors and it is not without value for Australians—especially beginners.

From an English point of view the illustrations and calendar are very helpful, but as the species and seasons are different here, a local collector will not profit much from them. The technical information about the

life-cycles of the Lepidoptera is easily absorbed and makes interesting reading for any naturalist. The large sections of the book devoted to collecting, breeding and preparing specimens not only of moths and butterflies, but also their eggs, larvae and pupae, are of special interest. The attention paid to the living animal, as distinct from the museum specimen, is praiseworthy.

W. G. BUICK.

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Hon. Editor - - - - T. R. N. LOTHIAN

The author is responsible for the facts and opinions recorded.



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This Section was founded in 1883 for the purpose of affording observers and lovers of Natural History regular and frequent opportunities for discussing those special subjects in which they are naturally interested; for the Exhibition of Specimens; and for promoting Observations in the Field by means of Excursions to various collecting grounds around the Metropolis.

The Monthly Meetings of the Section for Lectures, the Reading of Papers, and Exhibition of Specimens are held on the third Tuesday, at 8 p.m., at the Royal Society's Rooms, Institute Buildings, North Terrace, Adelaide.

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Members are urged to take Receptacles for the carrying of Specimens. At each outing every member is expected to collect Specimens wherever possible, and to hand them to the Leader for identification, etc.

Committee Meetings are held on the second Tuesday of each month.

Postal address of the Section—

Box M 1594, G.P.O., Adelaide;

or—

C/o. Royal Society's Rooms, Institute Building, North Terrace, Adelaide.

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SOUTH AUSTRALIAN NATURALIST

Section Founded 1883 : : S.A. Naturalist Founded 1919

EDITORIAL

The present issue is a double one, completing volume 26, as parts 3 and 4. The Committee decided that this action was desirable to utilise the large number of articles and reports of excursions. Unfortunately, no illustrations are possible in the present number, but it is hoped that these will occur in subsequent issues.

All members of the Section will be delighted to learn that at the Annual Meeting on July 15, 1952, our valued member, Professor J. B. Cleland, was unanimously elected an Honorary Life Member. Professor Cleland has been an active member since early 1920, a member of the Committee, and held the positions of vice-chairman and chairman. We all offer our congratulations and thanks to Professor J. B. Cleland and wish him continued good health.

Members will note with pleasure that Mr. Crosbie Morrison, who will be attending the Ornithological Union Congress in September, has agreed to give an illustrated talk. This will be held in the Library Institute lecture room, Kintore Avenue, on September 22 (Monday), at 8 p.m.

The Honorary Editor will welcome nature notes, articles and descriptions of trips or excursions. Country members are especially invited to contribute articles to the "South Australian Naturalist."

All members are urged to note the dates — October 3 and 4 — when our Wild Flower and Nature Show will be held in the Liberal Club Hall. Preparations will take place on Thursday, October 2, and members willing to assist should advise the Show Convenor or Honorary Secretary immediately. The Show will be officially opened at 3 p.m.

In 1936, the Section with financial aid from the Commissioners of National Park issued a handbook of "National Parks of South Australia" as volume 17, parts 1 to 4, of the "South Australian Naturalist." Members will be pleased to learn that the Commissioners have arranged for a number of authorities to rewrite the articles. These will be contained in the new handbook which the Commissioners hope to issue sometime in the future.

After considerable deliberations, the Sub-committee appointed to investigate the Rules of the Section reported to the Committee. A special meeting was called on July 15, at which the Sub-committee's proposals were placed before the 35 members who attended. These included the separating of the present Rules into Rules and By-laws, plus a number of additions. All of these were adopted by the meeting and will become effective when they have been approved by the Royal Society.

The Honorary Editor is anxious to obtain No. 2, volume 1; No. 1, volume 3; and No. 1, volume 15 of the "South Australian Naturalist." If any member has copies to spare he would be pleased to hear from him.

Christmas Camp — to be held at "Sea-Acres," Corny Point.

Members who spent Christmas week, 1950, with Mr. and Mrs. Hill, on their Yorke Peninsula property, have many happy memories of the hospitality extended by these kindly folk. This year, a larger party will leave Kintore Avenue corner at 8 a.m. Christmas Day, and return in the afternoon of New Year's Day. Mr. Gunter will remain in camp with us, and his bus will be available for scenic and collecting trips.

A Meeting of Campers will be held in the Royal Society's Rooms, at 8 p.m. on Friday, August 15, 1952, and interested members are urged to attend, as it is hoped to finalise all arrangements relating to transport, supplies, etc., at this meeting.

Note.—Enquiries concerning camps and bus trips should be addressed to the Honorary Treasurer.

[The locale of the Easter Camp, 1953, has not yet been decided upon. Further information will be published in the next issues of the "Naturalist."]

OUR LARGEST SOUTH AUSTRALIAN SPIDER

By H. WOMERSLEY

(Entomologist, S.Aust. Museum)

Recently two specimens of our largest spider, *Selenocosmia stirlingi* Hogg, 1901, have been sent in to the South Australian Museum for identification. One specimen was from Berri, the other was brought in by Mr. T. R. N. Lothian, from Loxton.

This spider is closely related to the more familiar trapdoor spiders of the Family Aviculariidae. It is placed scientifically in the subfamily Aviculariinae in having only two tarsal claws (the inferior third claw being obsolete), and in the tarsi being furnished with a ventral scopula of hairs.

The Aviculariinae contains a number of genera, the species of which are generally of large size, mostly found in tropical regions, and frequently referred to as Mygales or bird-eating spiders. They are generally very hairy and ferocious creatures and like the trapdoor relatives have powerful jaws which act in a downward direction. Their bite is very poisonous and often fatal.

Selenocosmia comes into the section Selenocosmieae in having the tarsal scopulae entire and not divided longitudinally, in the legs being devoid of spines and in the tarsi being obtuse apically and slightly narrower than the metatarsi.

Of the genus only two species are known with certainty from Australia, *S. crassipes*, L. Koch and *S. stirlingi* Hogg.

S. stirlingi is rather lighter in colour than *crassipes*, and has the front row of eyes lying in a straight line, whereas in *crassipes* they are said to be procurved; that

is the curve is convex when viewed from in front.

Both species are quite large, about $1\frac{3}{4}$ —2 inches in length, and having a leg span of about 4 inches. Like most of the trapdoor spiders they are nocturnal in habit. They tunnel in fairly hard ground, making a slanting tunnel lined with silk to a depth of a foot or more, at the bottom of which is a rough chamber. A specimen of *crassipes* from the runway of the aerodrome at Tennant Creek, which was kept alive for some months in the Museum recently, also spun a considerable area of silk over the ground surrounding the tunnel entrance. These spiders do not construct a trapdoor of any kind. *S. stirlingi*, although not common, is widely distributed, and Hogg (1901) states that he met with it from New Guinea, through Queensland to the northern borders of New South Wales, through Central and South Australia, and from the latitude of Perth in Western Australia. *S. crassipes* is rarer and appears more in the drier areas.

Rainbow and Pulleine 1918 (Rec. Aust. Mus.) recorded *S. stirlingi* from Pichi Richi and Mallala and in the South Australian Museum are also numerous specimens from Orroroo, and others from Wilmington, Booleroo Centre, Broken Hill, Caliph and Mt. Burrell.

S. crassipes is represented by a specimen collected by the Horn Expedition, and specimens from Darwin and Tennant Creek.

THE COLOURED BULB OF DROSERA WHITTAKERI

"In the hills around Adelaide there grew a species of *Drosera* (*Drosera Whittakeri*) which had a small coloured bulb. Rennie, interested to find out what was the colouring matter, isolated droserne, and Professor Macbeth had continued the investigation of this compound and related substances. Droserne had no economic importance and remained a compound only of academic interest. But in the discovery of vitamin K the absorption spec-

trum showed that it was related to droserne, and with the help of this earlier work its constitution was established by degradation and synthesis within six weeks of its discovery."

Extract from Professor L. H. Briggs' (Auckland) Presidential Address to Section B, Australasian and New Zealand Association A.L.V. of Science, Brisbane, May, 1951. Vide: Med. J. of Australia, August 4, 1951, p. 168.

—J.B.C.

WILD FLOWER POPULARITY POLL

By N. LOTHIAN

At the Wild Flower and Nature Show of 1951 a poll was conducted in an endeavour to discover which, of the many beautiful Australian plants displayed at our Show, the public considered were outstanding. A poll of this nature, of course, does not give conclusive results for the obvious reason that many plants of equal beauty or interest were either not exhibited or were not in flower. Then again, to try and weigh the pros and cons as to whether the Kangaroo Paw is more beautiful than the Waratah is similar, shall we say, to trying to decide whether a motor car is of greater use than a diesel electric engine. That each of these machines has its uses is obvious just as is the question of the ease with which the Kangaroo Paw or the Waratah could be cultivated in a particular locality.

When all is said and done the question of cultivation will frequently decide the popularity of any plant whether native or introduced, although there is, for some unknown reason, a definite lure always for the gardener to attempt to cultivate the very difficult!

Given hereunder are the ten most popular Australian species listed from a total display of over 250 species. In all, however, practically 110 species were voted on, the total number of votes being approximately 1,500, and it will be noted that the first ten popular plants received almost half that number. They are as follows:—

<i>Anigozanthus Manglesi</i>	77
<i>Glianthus speciosus</i>	75
<i>Telopea speciosissima</i>	75
<i>Eucalyptus torquata</i>	69
<i>Boronia heterophylla</i>	66
<i>Leschenaultia bilobi</i>	61
<i>Chamaelaucium uncinatum</i> ..	58
<i>Scholtzia oligandra</i>	45
<i>Dryandra formosa</i>	39
<i>Darwinia macrostegia</i>	30

These ten were closely followed by *Hakea cucullata* (Royal Hakea) and *Calistemon rugulosus* (Scarlet Bottle Brush) 28 votes, *Melaleuca radula* and *Chorizema cordata* with 27. There is a distinct gap between this group and those which appeared, naturally, to a limited number of

people; some of these, however, should be listed. *Actinodium Cunninghamii*; *Bankisia ericifolia*; *Bauera* (both species); *Boronia serrulata* (Sydney Rose); *Calothamus* species; *Calythrix tetragona* (Common Heath Myrtle); *Dendrobium speciosum*; *Eucalypts Kruseana*, *macrocarpa* and *preissiana*; *Hypocalymma robusta* (pink Myrtle); *Prostanthera incisa rosea* and *Tetralthea halmaturorum*.

One's immediate re-action to these lists is surprise that what one considers a most desirable plant has not been included, e.g., no *Grevillea* received over ten votes, although six species were included. Only one *Melaleuca* is listed, while such groups as *Beaufortia*, *Brachysema*, *Isopogon* and *Eriostemon* received scant attention.

Regarding this list one is immediately struck with the high percentage of non-South Australian plants which, of course, at once points out the problem of their cultivation. Of the first ten, two only, namely, Coolgardie Gum and Geraldton Wax Flower are easily cultivated, and therefore commonly grown. Both are Western Australian, as is *Chorizema cordata*, which is in the "also rans."

The cultivation of our Australian plants is no more difficult than any other group of plants, and general principles have been given in a previous article (South Australian Naturalist, Vol. 26, No. 2, pages 29-31). Under our South Australian conditions, two factors militate against the easy and successful cultivation of our plants, namely, hard water and limestone conditions. Areas which do not have limestone can usually grow a wider range of plants than those that do, while the control which the climate has over plant growth is noted when we compare the cultivation of plants in non-limestone areas on the plains and in the Mount Lofty Ranges.

I would emphasise the following for the successful cultivation of our Australian plants. First, select species which have a reasonable chance of surviving under local climatic conditions (governed by the following, this more or less covers 90% of all plants any one would like to cultivate).

(Continued over page)

A NATIVE SANCTUARY IN THE FOOTHILLS

By EDGAR W. PRITCHARD

In brief, this is a scheme for a native animal, bird and plant sanctuary in one of the gullies running into the hills, along the lines of the Collin McKenzie Sanctuary in Victoria, but larger and under more natural conditions.

The object would be to provide a means for naturalists, tourists and the general public to see and study the Australian flora and fauna in a natural setting.

A blind gully would be best with no through traffic, with some grass land for the animals and some scrub for the wild flowers, and it should be within walking distance of a tram terminus. As to the area a fence along the tops of the ridges and across the end of the gully would be the ideal thing; but a smaller piece would be sufficient for a start.

Now, as to the advantages of such a scheme. First it must be very disappointing to overseas visitors to find, when they arrive, that the native flora and fauna, about which they have heard so much, can be seen only by travelling hundreds of miles into the interior. There is no other capitals which has the necessary setting right at its door; therefore an easy means of seeing something unique should be a great tourist attraction, and certainly should be provided for our overseas visitors.

Second, it would be an effective means of giving our own people an afternoon's enjoyment, for increasing their knowledge of our plants and animals, and arousing interest in their preservation.

Third, it would provide a fine field of study for scientists and naturalists, where they could spend any spare afternoon observing native plants and animals. The only place where this can be done at present is Flinders Chase, which is so difficult to reach that few people can spend even a short time there.

Fourth, it would be a sure means of preserving a patch of native flora close to the city, before it has all been destroyed by grazing animals.

Fifth, it would be a very useful addition to the outer green belt of the city, which recently has been suggested, and appears so desirable.

The last point is the means for carrying it out. I think such a scheme would be too big for any private body to undertake. The Government body under which it would come would be the Tourist Bureau, and as it is all to their interest to have something unusual to show visitors, support of the Government for the scheme would most likely be obtained through that point of view.

I would suggest that, if the Government could be induced to provide the money, the scheme could be carried out and managed by a board on which the Tourist Bureau, the Royal Society and the Field Naturalists should have representation.

WILD FLOWER POPULARITY POLL

(Continued from previous page)

Secondly, ensure good drainage and, if possible, limestone free soil. The first of these is important, the latter can be overcome by the use of a compost, well decayed manure; in fact any organic matter either incorporated in the soil or used as a heavy mulch on its surface. Thirdly, the use of "correcting chemicals," such as sulphate of ammonia, iron sulphate or sulphur must be considered to prevent chlorotic conditions occurring in our plants.

In spite of these drawbacks and criticisms as given above, the poll conducted drew the public's attention to the many really beautiful Australian wild flowers and it is now up to each and every one of us to see that these are readily available from nurserymen or others who sell plants. Only in this way can we ensure the improvement of our garden flora which will stand up to our local conditions, and prevent many species from becoming totally extinct.

SECRETS OF THE SWAMPS

By KEN DUNSTONE.

"A person who spends his spare time fossicking in swamps for rare and unusual plants, whilst suffering the endless droves of mosquitoes and risking an encounter with a black snake." What is the best definition of such a type?

I would venture the coined word "*heleophile*," which is simply the Greek for "swamp-lover."

I am proud to say that I belong to such a category of odd people.

Some of my most pleasurable moments have been spent in oozy black mud up to my ankles, "hidden in the bulrushes," and wearing little else but shorts and old sandshoes, the best attire for such occasions.

While hoping to find something new or rare, one has to keep the whole of one's attention on the ground, as it pays to be alert in snake-infested country. It is an easy matter to spoil an otherwise successful day by being a trifle too slow.

"Full many a flower is born to blush unseen,

And waste its sweetness on the desert air"

How familiar these lines are to us. How unpromising seems a clump of rushes as we approach it. Yet hidden within it may be some rarity or some floral gem which we did not dream was there.

Waterways of any sort have always held an irresistible attraction for me, be they small, artificial channels or narrow, winding creeks. I am always at home with water, even a temporary winter swamp sometimes holds surprises for the botanist, maybe a sedge new to him, or perhaps an introduced grass, all of these superficially uninteresting things helping him to extend his horizon.

Supposing we follow some field botanists in their meanderings in strange marshy places where the only discovery for the day may be an unusual rush or sedge.

We find that our botanists have decided to spend a few hours hunting in a salt-swamp. In such a locality, with its very common samphires of various species (mainly *Arthrocnemum* and *Salicornia*) and groups of white mangrove (*Avicennia*

officinalis), we will not linger very long, as we are anxious to get off to the fresh-water areas. We are near Ethelton, and find that the rush, *Juncus acutus*, has spread considerably since our last visit. This rush is new to the area, having come from up North, apparently.

Further south, at Fulham, we are searching again. This time we notice a pennywort (*Centella Asiatica*) growing in a small creek which is dry for most of the year. Then along the break-out channel, *Rumex bidens* is seen, its reddish swollen stems making a pleasant contrast with the more sombre greens and browns of the sedges and rushes.

Our botanists, in addition to keeping a lookout for any features of scientific interest in even the commonest water-plants, have a most acute sense of the beautiful, and never tire of stooping to examine the tiny irregular flowers of *Mimulus repens*, or of surveying the well-ordered ranks of *Typha*, the bulrush, which has the common name of reed-mace.

Low down on the ground, multitudes of swamp-buttons (*Cotula coronopifolia*) brighten the margins of the pools, and the surface of the water a little way off is powdered with the pollen of *Ruppia maritima*, whose narrow grass-like leaves are found in many a brackish pool.

Well, let's leave our wanderers for the time being, while I give some details of a very recent excursion of the Field Naturalists, a party of whom visited the Mount Compass swamps on January 28, 1952.

The writer was with the party, who unanimously expressed their appreciation of the interesting variety of rare and beautiful plants seen.

It was a really memorable day, the high-light undoubtedly being the finding, by members of the group, of the two "rara aves," two most lovely and unusual orchids, the little "Ladies' tresses," (*Spiranthes sinensis*) with its spikes of spirally arranged flowers wrought with superb artistry as if from the finest pink china, and the equally uncommon *Cryptostylis subulata*, bearing yellowish-red "reversed" flowers almost im-

possible to see because of their character of blending with the surrounding vegetation.

The first stop was made just before reaching Mount Compass township, and a small swamp adjoining the road was investigated. The notable finds here were the insect-trapping bladder-wort (*Utricularia dichotoma*), whose fragile purplish flowers are raised on long slender scapes, the club-moss (*Lycopodium laterale*), this State's smallest rasp-wort (*Halorrhagis micrantha*), and the swamp-heath (*Sprengelia incarnata*).

The party was directed to take particular notice of areas of swamps such as this, as the district is rapidly being cleared and drained and the time is quickly approaching when we will have to move further afield to observe in its unspoiled condition the vegetation of peaty swamps.

The juvenile leaves of *Viminaria denudata* were pointed out to the party. It is truly a most remarkable thing that this plant should still retain traces of its original leguminous leaves after many millions of years; these true leaves are found at the bases of the young plants, later on their place being taken by the long thin petioles which carry on the function of leaves.

Another living fossil is the clubmoss, which, in this State, is largely confined to peaty areas. This diminutive plant is now one of the survivors of a race of giant tree-like forms which once flourished on the earth, and from the partial decay of these much of the world's coal has been formed.

In the swamp the fertile spore-bearing leaves of *Blechnum capense* and *Lindsaea linearis*, two water-loving ferns, were compared with their ordinary sterile leaves. Now and again, we saw the beautiful clover, *Trifolium pratense*, which, though introduced, does not appear to be ousting the native plants. The same may be said of the bird's-foot trefoil, whose scented yellow flowers are to be seen in many moist places in the district.

The most abundant plant was a *Lepidosperma* which imparts to the swamp a very characteristic appearance or what the ecologist calls a "facies." Later on, we saw a rather different sort of facies at the Square Waterhole area, where a wattle and a tea-tree thrive along the creeks in the marshes.

Some of the most interesting but less easily seen plants of this wet area of only

a few acres were the dwarf *Centrolepis strigosa*, a sundew with curious two-cleft leaves (*Drosera binata*), and the small plants of a *Hypolaena*, which, when it attains its true size in very wet parts, deserves the vernacular name of "swamp-tangle," as it forms very dense intertwining masses.

Moving along further to the other side of Mount Compass, our most profitable time was taken up in wandering over a swampy patch through which several drainage channels run.

We walked across a dry grassy paddock and came suddenly upon a scene which gave us one of those rare thrills, of which the naturalist retains precious memories.

Along a fairly large channel grew masses of our rare coral-fern (*Gleichenia circinata*) and a profusion of a much commoner but nevertheless beautiful fern, *Blechnum capense*; occasional tea-trees (*Lepidosperma scoparium*) rose above the creek with their very leafy branches, and in the channel itself was an abundance of the pretty pink spikes of *Polygonum minus*, these mingling with the yellow of the trefoil.

In the water flourished the introduced *Gratiola peruviana* alongside the *Lobelia anceps*.

It seemed as if all nature smiled; the sun shone, the flowers displayed their best, and a gentle breeze tempered the atmosphere. We were just content to stand there in the lovely place and absorb all the beauty around us.

Naturally we left with reluctance, but some more surprises awaited us. Nearby we found the two orchids, the pygmy sundew (*Drosera glanduligera*) (the full-grown plant is less than half an inch across and bore minute white flowers on stems as thin as a hair) and the larger white flowers of *Drosera binata*.

Time goes on swift wings when one is occupied in examining the strange plants of the swamps, and we turned our footsteps for the bus again.

Earlier this year I noticed the tiny annual, *Selaginella preissiana*, in a swamp near Kuitpo Forest, and at the same time there were numerous little *Microtis*, a green orchid which appears in swamps in the summer.

It is essential for the diligent seeker of swamp plants to go down on his hands and
(Continued at foot of next page)

LEGUMES AND SOIL FERTILITY

By EDGAR W. PRITCHARD.

When you come to think of it, it is a remarkable thing that in a state of nature quite a lot of different species of plants grow together in great profusion. Why is it that, though they are so different, they all live on the same soil, in the same situation, watered by the same rain and absorbing the same sunshine? Why is it that the strongest species, the one which is best suited to that soil and climate, does not choke out all the others?

The answer is that each variety must in some way help the other varieties to grow, and thus retain its place in the plant community. Just how this rule operates is not yet well understood, but there are a few cases in which it can be clearly seen.

Now for the healthy growth of plants four main elements are needed, namely, carbon, phosphorus, sulphur and nitrogen. The carbon is obtained from the carbonic acid gas of the air, the phosphorus chiefly from the phosphate of lime and the sulphur from the sulphate of lime of the soil. But while there is an abundance of carbon in the air, and a good supply of phosphorus and sulphur in most soils, there is no nitrogen occurring naturally in the minerals from which the soils are formed. It must be taken from the air, in which there is an almost unlimited quantity.

How is this done? By one particular group of plants, which we call the legumes, the pod-bearers: peas, beans, clover, tree-lucerne, and so on. In our native flora they occur in abundance: the wild lilac, the scarlet runner, the pultenacias, the daviesias, the swainsonas, and the cassias and wattles. There are few, if any, plant com-

munities, without them. In the wild heaths of Europe there are, among many others, the broom and the furze, which have been introduced into Australia.

Pull up a bean plant, and you will find on the roots clusters of small nodules. These are really a kind of plant wart caused by colonies of bacteria, which while they live on the sap of the plant, extract nitrogen from the air and pass it on to the plant to be built into its tissues. A lucerne crop, for instance, will by this means collect from the air up to 200 pounds of nitrogen to the acre, equal to about 18,000 gallons of nitrogen gas. For nitrogen is one of the essential ingredients of all proteins, and so of the protoplasm of all plants and animals.*

The legumes then use this captured nitrogen to form their own tissues. But as they die and gradually decay, the nitrogen of the proteins combines with the potash of the soil to form nitrate of potash. And this substance can be absorbed by practically all of the higher plants to form their own proteins. This indeed is the only way in which they can grow and develop.

So it will be seen that the non-leguminous plants in any plant community are very largely dependent for their very existence on the legumes among which they grow. Also this is a striking instance of co-operation in nature, as contrasted with the all too much emphasised competition.

* NOTE.—A small, but insignificant, amount of nitrogen in the form of ammonia, about six pounds per acre per year, from the decay of animal matter is dissolved out of the air by the rain and washed into the soil.

Secrets of the Swamps—(continued).

knees, if he is to find the really tiny things, for it is only by very thorough searching that it is possible to see the plants which are otherwise concealed by the tall sedges.

Summer is really the best time to roam around the swamps as many plants flower then, and it is also best to get to the wettest

places, as these are often inaccessible in winter.

So year after year the botanists visit various marshy areas, and, who knows, some new species may come to light, even if it is only a new record for the State?

NATIVE PLANTS GROWING ALONGSIDE A RAILWAY LINE

By KEN DUNSTONE.

As naturalists, our main object is conservation. Therefore, to all of us, it is a matter of great interest to know that even at the beginning of 1952, there are certain remnants, at least, of the flora which once covered the Adelaide plains.

In the course of nine months' travel on the Port line, between Adelaide and Alberton, I have noted 14 native plants. All were seen from railway carriages, so that there are possibly more lingering on, especially those of lowly nature or short life.

Just in passing, it is worth while mentioning that some of the best places for original vegetation are along railway lines, mainly because of the protection from grazing.

It is interesting that all of the following plants are of a perennial nature.

The grass, *Enneapogon nigricans*, with the vernacular name of "black-heads," occurs in a few isolated clumps near the Kilkenny and Cheltenham stations. This is one of the very few areas, to my knowledge, where this survives. It must have occurred all over the Adelaide plain at one time.

A yellow-flowered *Senecio* is found as flourishing groups at Woodville and is likely to hold out there for some time yet.

Two other native grasses are very common along the line. They are a wallaby-grass (*Danthonia*) and a spear-grass (*Stipa scabra*).

The pretty little pink-flowered *Convolvulus* (*C. erubescens*) climbs among the weeds and is very common.

Several sedges are seen. A *Carex* is growing well in many places. *Scirpus nodosus* and *Cyperus gymnocaulos* are both seen near Alberton.

A salt-bush (*Kochia*) is numerous as one nears Cheltenham.

The bulrush (*Typha angustifolia*) grows in an artificial drain.

The little native soursob (*Oxalis corniculata*) is very common, and the lily (*Dianella revoluta*) grows in occasional dense clumps.

There are some very good patches of our common bluebell (*Wahlenbergia*) right alongside Holden's factory, and finally, the little prostrate summer-flowering *Boerhavia diffusa* covers many square feet with its long runners in many places. The aborigines used to eat the thick rootstock of this plant, which is in the same family as the showy Bougainvillea, though one would not suspect it superficially.

The fact that the above plants mostly have thick underground rootstock and that they are in fenced-off areas helps to account for their survival.

It will be interesting to see how many of them are left in another twenty or thirty years' time.

In the South Australian Naturalist of February, 1924, Mr. E. H. Ising describes a list of 17 native plants which he observed growing in the limited area of the railway reserve at Mile End. Many of these are not in my list, so I think that they have died out during the last 25 years.

At this stage note should be made of a raspwort (*Halorrhagis* sp.) which survives still in a few densely populated suburbs, such as Millwood, where its shoots appear on a footpath year after year.

Then the *Teucrium racemosum*, which is common along the Murray, occasionally is seen in the most unlikely places.

I discovered it beside the South Road, near Darlington, where it was surrounded by introduced grasses. I consider its life here will be very short, although I hope not.

There is a flourishing colony of a native peaflower (*Psoralea patens*) along the railway line just over Marion Road. In common with many others of the *Leguminosae*, an occasional fire seems to assist its survival by helping to germinate the seeds. Along the line a little way from it is a fine group of the golden wattle (*Acacia pycnantha*), and along the Marion Road at Ascot Park I have seen several healthy shrubs of the *Acacia victoriae*, with its heavily scented flowers. In a paddock not far distant I was amazed to find the *Marsilea brownii*. This

(Continued on page 63)

THE INTRODUCED FLORA OF THE ADELAIDE PLAINS

By J. B. Cleland.

For the last ten or twelve years I have been keeping a record of the plants, natural and introduced, of the Adelaide Plains, and of the dates of the earliest and latest flowering of each species. The last mentioned may be of value in hay-fever when searching for the pollen responsible for the condition. The Adelaide Plains for this survey extend from the foothills of the Mount Lofty Range on the east to Tapley's Hill Road on the west—the Flora of the Adelaide Coast, extending from this road westwards to the sea has been dealt with in a previous publication. On the south, the foothills again bound it, terminating at the Flagstaff Hotel. The limit in the north has been the Little Para River.

AA before the name of the plant means that it has been found growing within the four terraces of the City of (S.) Adelaide. A only means that it has been found within the boundary fence of the Parklands of the City of Adelaide.

The dates of flowering are those actually observed and recorded. It will be seen that there is much more to be done in this connection. In some cases I have no record as yet, in many others the flowering period can be considerably extended, especially during exceptional seasons. The present however is a jumping off ground to which many can add in the future. The species are numbered to facilitate the publication of additional notes.

The fragrance or its absence of a number of these plants has been noted.

A = Within bounds of the city of Adelaide (i.e. city and boundary fence of the park lands).

AA = Within the four terraces around the city proper.

1.A—*Pinus halapensis* (Aleppo Pine). At the top of Beaumont Road, a number of seedlings are coming up on roadways and adjacent fields.

2. A—*Sorghum halepense* (Johnston Grass). November 18 - June 14 (stamens and pistils, November 26 - May 17). This grass sometimes liberates hydrocyanic acid

when chewed and death may result from animals gorging on it. The underground roots (rhizomes) are very succulent and penetrate deeply so that the grass is hard to eradicate. Horses eat the roots readily when dug up.

3. A—*Paspalum dilatatum*. November 20-May 30 (stamens, November 20-May 2). Stamens dark purple, the feathery styles blackish. This well-known fodder grass appears spontaneously in many places.

4. AA—*Digitaria sanguinalis* (Summer Grass). November 19-June 2 (stamens, November 19-May 11). This grass is too small to be of any fodder value and is merely a mild nuisance. It is common in summer time in watered gardens. It is probably an introduction to the Adelaide plains.

5. AA—*Echinochloa crus-galli* (Cockspur Grass). February 12, March 2-April 27. Not common on the plains unless cultivated. One plant found in the gutter at the East End Market; spontaneous plants at Woodville, Parkside and Linden Park, Zoological Gardens beside a cage.

6. A—*Setaria verticillata*. December 7-April 15 (stamens, December 7-March 12). The barbs on the glumes readily catch in anything and may even pull the feathers out of birds that come in contact with the grass. Common in uncultivated gardens. A considerable nuisance from adhering to stockings, etc., and of no commercial value.

7. A—*Pennisetum villosum*. November 28-June 11 (stamens or styles, November 28-May 12, June 10 (styles). An ornamental grass growing in tussock form and rather harsh which has established itself on roadsides and similar places. It has been here many years, but so far has not monopolised much ground. It probably can be eaten by stock when more nourishing grasses are not available.

8. *Stenotaphrum secundatum* (Buffalo Grass). Common on lawns and occasionally appearing spontaneously. January 26 (stamens).

9. AA—*Ehrharta longiflora*. July 18-March 31, May 12 (stamens or styles,

August 5-March 31). A grass looking somewhat like wild oats. May flower after rain during the summer months; probably of little fodder value.

10. A—*Phalaris minor* (One of the Canary Grasses). September 20-January 8 (stamens, October 5-December 24). A good fodder grass.

11. *Phalaris tuberosa* (Toowoomba Canary Grass). October 6-February 22, May 21-27 (stamens, November 25-February 22, May 21-27). A good fodder grass which has established itself firmly at Tusmore forming luxuriant tussocks, and at Netherby.

12. *Phalaris paradoxa*. x *Ph. tuberosa* or *minor*. October 21, November 28-December 19 (stamens, December 2-19). Has appeared on a back road at Glen Osmond. Good fodder.

13. AA — *Oryzopsis miliacea* (Many-flowered Millet-grass; Rice grass). October 7-July 21 (stamens, November 2-January 26, June 2-July 5). Grows in waste places. The stems soon become slender rather rigid canes; tufted but easily uprooted. Horses eat it readily.

14. *Polypogon monspeliensis*. December 14 (stamens). Common in marshy soil in the hills and South-East. On the plains, so far only found beside Tapleys Hill Road west of the air field and in a patch of swampy ground at Glen Osmond, Dec. 12.

15. *Agrostis verticillata*. December 7-January 7 (stamens December 28-January 7). Grows beside streams and in water courses; roadside at Glen Osmond.

16. *Gastridium ventricosum* (Nit Grass). November 24-December 26 (stamens, November 24-25). Grows in the National Park, but rare on the plains. Has been found in an olive plantation at Beaumont. Too slender to be of much fodder value.

17. A—*Lagurus ovatus* (Hare's Tail Grass). November 15-20. On the golf course in the park lands and at Highbury. A hairy grass, of no value.

18. A—*Aira caryophylla*. October 7-November 11 (stamens, October 27). A very delicate grass with a prominent awn. Too small to be of any fodder value.

19. *Avena sativa* (Wild Oats). May 28-December 5 (stamens, September 19-December 5). A common grass, sometimes known as Black Oats. It comes up abundantly after rain and may keep on appearing

whilst the rains last. It grows readily again on being cut.

20. AA—*Avena barbata* (Bearded Oat). April 17, May 17, August 9-January 21 (stamens, November 2-December 4, March 15). Perhaps more common than the Black Oat. Comes up readily and flowers and fruits quickly after the rains come.

21. AA—*Avena sativa* (Cultivated Oat). April 6, May 30, September 10-December 29 (stamens, December 5). The Cultivated Oat comes up spontaneously on roads etc. from seed that has fallen, and has even been found within the city proper.

22. *Holcus lanatus* (Yorkshire Fog). December 4-January 7 (stamens December 28-January 7). Common in the hills and at Encounter Bay, but on the plain has only been found on a roadside at Tusmore Park.

23. AA—*Pentstemon thunbergii*. November 15. This pretty and elegant grass, which is common by the roadside leading to Mount Pleasant, has not established itself on the plains but plants have been found at Highbury and one in Tavestock Street between the pavement and an adjacent wall, the seed probably having been brought in produce to the nearby East End Market.

24. AA—*Koeleria phleoides*. September 17-December 5 (stamens, September 24-December 5). A small grass, common on footpaths. Too small to be of any practical value.

25. *Briza major* (Greater Quaking-grass). October 8-November 7. Quite common by roadsides etc. Of no value.

26. *Briza minor* (Lesser Quaking-grass). October 4-November 7 (stamens, November 5). Common in uncultivated plantations etc. Of no value.

27. A?—*Dactylis glomerata* (Cocksfoot Grass). November 5-December 17 (stamens, November 5-January 4). Uncommon on the plains. Recorded doubtfully on the University Oval. Good fodder.

28. *Eragrostis cilianensis* (A Love-grass). April 27 (not quite out). May 11-June 11. Has appeared at Knoxville and Modbury.

29. AA—*Schismus barbatus*. Appeared in Victoria Square in 1944 on mounds of earth beside air-raid trenches. Common in the drier parts of the North and East of the State. Of no value.

30. A?—*Poa pratensis* (Meadow Grass). October 24–November 28 (stamens, October 24–November 21). A good fodder.

31. *Poa pratensis* var. *hirtula*. Beaumont.

32. A—*P. bulbosa*. September 27 (stamens, October 5–11). A good fodder.

33. AA—*P. annua* (Annual Meadow-grass). June 11–November 21 (stamens and pistils, June 27, July 5–August 9, November 21). This is a very common small grass that persists throughout winter and well into spring. It is too small to be of much fodder value.

34. AA — *Vulpia myuros*. (Rat's-tail Fescue). August 27–December 10. In this Fescue the flowering stem is sheathed to the first branches. This and Squirrel-tail Fescue are common slender grasses of little fodder value.

35. V. *bromoides* (Squirrel-tail Fescue). September 19–October 7. In this one there is a long naked portion of flowering stem above the sheathing leaf.

36. AA—*Scleropoa rigida*. September 8–December 5, February 21 (stamens, October 27). A rather slender rigid small grass of little fodder value.

37. AA—*Bromus rigidus* (Great Brome Jabbers). September 3–October 28. This grass is common; it is not much relished by horses and is hurtful on account of the stiff rough awns. It can be recognized by the size of its awns and the pubescent stem.

38. AA—*B. madritensis* (Madrid Brome). August 20–November 21 (stamens, November 21). A smaller brome grass with smooth stems; very common. The flowering head tends to turn purple. This grass does not seem to be relished by stock.

39. AA—*B. catharticus* (Prairie-grass). October 14–May 17, September 17. (yellow stamens, October 14).

40. A—*B. mollis* (Soft Brome). October 14–January 10 (stamens, October 17–January 10). A soft hairy grass of little value.

41. A—*B. hordeaceus*. October 7–December 12 (stamens, October 17–November 21). Small and soft and lacking the hairiness of the glumes.

42. *Brachypodium distachyon* (False Brome). October 7–December 11 (stamens, October 28–December 11). A small grass of little value.

43. AA—*Lolium perenne* (Rye-grass). September 18–December 29 (stamens, Sep-

tember 18–December 29, much pollen, December 4). More or less a perennial grass, tufted grass without awns and with the flowers exceeding the sheathing bract. A good fodder plant.

44. *L. subulatum*. October 21–December 6 (stamens, September 21–December 6). A more rigid grass and rather slender. The sheathing bract is as long as the flowering part.

45. AA—*Triticum aestivum* (Common Wheat). September 6–27, November 20. The cultivated wheat occurs spontaneously from time to time by the roadside and fallowed fields. The bearded wheat which is a form, has been found fruiting by roadsides.

46. A—*Lepturus cylindricus*. November 16–December 6 (stamens, November 28–December 6). A small, rather rigid grass, rather like *Lolium subulatum*.

47. AA — *Hordem murinum* (Barley-grass). June 2, August 22–December 9 (stamens, August 16, October 3–November 21). A very common grass which flowers over a long period if rain falls. The awns are a nuisance from sticking into clothing. Valuable as a fodder.

48. *H. maritimum* (Sea Barley). November 17–December 29 (stamens, December 29). Not so common as Barley-grass, and preferring situations near the sea and salty ground, but met with often far away from such conditions, e.g., National Park. It is smaller than Barley-grass and if the fruiting part is held up to the light, it will be found lacking the fringe on some of the awns which characterise Barley-grass.

ARACEAE FAMILY

49. A—*Zantedeschia aethiopica* (Arum Lily). September 22–December 6. This introduction is common in moist gullies in the hills. On the plains it has only been found spontaneously near Tea-tree Gully.

SEDGES

50. AA—*Cyperus rotundus* (Nut-grass). October 11–June 27 (stamens, October 11–November 19, February 17–June 27). This little sedge is a great nuisance in gardens in Adelaide and suburbs. It is abundant along pavements in Kintore Avenue. It has underground tubers, hence the name Nut-grass. It is closely allied to another species

which occurs in Central Australia, whose tubers are eaten by the natives.

51. *Cyperus flabelliformis*. February 14. This handsome sedge is a garden escape, which has appeared spontaneously at Burnside and Beaumont.

52. AA—*C. sp.* Pulteney Street, between the pavement and wall.

LILY FAMILY

53. *Asparagus officinalis* (Edible Asparagus). This plant has appeared spontaneously at Lockleys. The red fruit may be eaten by birds which are probably responsible for its occurrence at Encounter Bay and in the hills. Escaping from gardens many years ago, it established itself along irrigation channels at Renmark.

54. *Asparagus medeoloides*. This has a broad simple leaf and is evidently distributed by birds sometimes far afield. Plants have been found on the plains at Beaumont, Glen Osmond, Modbury and also in the National Park. It has been found covering shrubs near Goolwa, Kingscote K.I., and near the Todd River Reservoir on Eyre Peninsula.

55. A—*Asphodelus fistulosus* (Wild Onion—an unfortunate name). The plant does not taste or smell of onions and cattle will not touch it. April 27-December 29, February 3. This plant is in full bloom between August 7 and October 7. When fully out in abundance it gives quite a coral-red tint to the fields.

56. *Allium vineale* (All these *Alliums* taste of Onions). A pest at Enfield and Northfield. Flowering January 3, mostly bulbils in the heads instead of fruits but the flowers have now elongated with 0 to 14 in the head. It is very difficult to eradicate, as it multiplies by the bulbils in the roots, by bulbils taking the place of some of the flowers in the heads, and also by seed.

57. A. *Ampeloprasum* (Wild Leek). Spreads by seeds and bulbils round the bulb. Growing at Beaumont. November 25-December 28.

58. AA?—A. *roseum*. This plant spreads by seeds and bulbils found in the flower heads and beside the bulb. A patch appeared in the Botanic Park near Frome Road in the spring of 1946. It was widely distributed in the neighbourhood including the Botanic Gardens in 1948. October

24-December 7. A species with broad leaves probably this was seen growing in the garden of the late Sir Joseph Verco (now John Martins), North Terrace, November 24, 1950.

59. A—*Allium triquetrum*. September 16-November 6. Readily recognized by its three-angled stem and onion smell. Growing in Botanic Park and at Burnside.

AMARYLLIDACEAE FAMILY

60. A—*Agave americana*. January 7-February 8. Grows at Beaumont and in the Botanic Park. This Agave is often called an Aloe. Its flowering stem is about 20 ft. long and the flowers are freely visited by honey-eaters.

IRIS FAMILY

61. *Antholyza aethiopica* (Aunt Eliza). Growing at Beaumont. There is a yellow form which is less common than the red. The yellow form has flowered as early as June 26; the red two days later. Other flowerings by July 15. Flowering freely by September 3, and a few flowers up to October 15. This is a garden escape which has become a nuisance in places, but it can be readily eradicated. When it is flowering in mass the red makes a colourful picture.

62. A—*Späxaxis tricolor*. September 27-October 8. This grows in the Magill Cemetery but is uncommon on the plains. It is very abundant around Blackwood.

63. *Babiana stricta*. A handsome garden escape. Beaumont.

64. *Romulea rosea* (Onion-grass). No smell. August 10-October 5. One of the so-called Onion-grasses on account of the shape of its leaves, but it has no smell of onion. This species with pink flowers and the next one with smaller pale blue flowers are pests in garden paths where the ground is firm and consolidated, but they do not grow in cultivated soil.

65. *Romulea columnae*. August 10-November 1.

66. *Iris germanica* (German Iris). September 3-October 26. White form, September 9-17. A garden escape probably growing from portions of the plant and not spreading by seed.

67. *Freesia sp.* September 9. Uncommon on the plains, but common at Blackwood.

68. *Watsonia sp.* A pink flowered plant was found on the roadside at Beaumont, October 3.

69. A—*Moraea xerospatha* var. *monophylla*. September 7-December 6. This little iris has a single long slender leaf and like the *Romuleas* is a pest on garden paths. The long leaves may entangle one's feet. Their tough fibrous leaves may lead to impraction if cattle feed upon this plant.

70. A — *Homeria collina* (One-leaved Cape Tulip). Rather unpleasant fragrance. September 4-26. Common in many places in the hills and has recently appeared in places on the plains.

71. var. *ochroleuca*. August 29-October 10. The yellow-flowered form has appeared at Beaumont.

72. A—*Homeria miniata*. August 31-September 27. Less common than One-leaved Cape-tulip in spite of multiplying by bulbils in the leaves' axils as well as on the roots and also by seed.

NETTLE FAMILY.

73. A—*Urtica urens* (the Common Nettle). No smell. May 11-December 26. Grows in waste places, old farmyards, etc. Readily eaten by horses. The sting character is now said to be due to a hystamine-like substance.

DOCK FAMILY.

74. A—*Rumex pulcher* (Fiddle Dock) (branches projected at right angles). October 9-November 21. Fruiting November 29-December 16, May 20. The larger Docks are hard to eradicate. They may constitute second-rate feed.

75. A—*R. obtusifolius* (Broad Dock). Flowers August 9-September 14, December 28-January 17. Flowers and fruits, November 16-20. Prefers rather moist situations. This plant grows on Victoria Drive.

76. *R. conglomeratus* (Clustered Dock). Flowers November 7. Fruiting December 4-15.

77. A—*R. crispus* (Curled Dock). No smell. An upright dock flowering September 13-November 28, April 29, May 20—June 2. Flowers and fruits, July 25. Fruiting September 15, October 8-February 5, April 9-May 20.

78. *Rumex Acetosella* (Sheep's Sorrel). No smell. November 8. Grows on sour soil, but not common on the plains. Sometimes when flowering it gives quite a warm reddish colour to the fields.

79. A—*Emex australis* (Prickly Jack, Double Dee). No smell. June 2, August 15-

September 29, October 17, February 5, April 29. A nasty weed introduced from South Africa, very common along Military Road near the Grange and also frequent elsewhere on waste or cultivated land. Readily punctures bicycle tyres.

80. AA—*Polygonum aviculare* (Wire-weed). Some in flower all the year, but flowering plants are few in winter. This prostrate plant is eaten by horses but is only of secondary value.

GOOSEFOOT AND SALTBUSH FAMILY

81. *Chenopodium multifidum*. A scented prostrate goosefoot growing at Woodville and Largs Bay. It covers a considerable patch of ground.

82. AA—*Ch. album* (White Goosefoot, Fat Hen). No smell. December 12-August 16. One of our common weeds, which may grow to several feet in height. Leaves and stem have a whitish, mealy appearance. In one form the leaves are tinted purplish and this has been used as a salad. Does not seem to be relished by stock.

83. A—*Ch. murale* (Nettle-leaved Goosefoot). September 9, October 21-June 13. A common weed in gardens and waste places, the leaves and stem having an obnoxious smell. Seems to be left alone by stock.

84. *Beta vulgaris* var. *cicla* (Silver Beet). Fragrant, scenting the air. May 23, November 21-December 5. A frequent garden escape, which seeds very rapidly.

85. *Atriplex hastata* var. *salina*. This introduction was first noticed in the saline swamps between Henley and Glenelg and afterwards towards Dudley Park. It was found on Torrens Lake beside King William Street Bridge later, on April 11, 1949.

86. A—*Amaranthus retroflexus*. December 15-April 27. This and following species are common weeds in gardens and waste lands in the summertime. In this species the perianth points are blunt and the following one has sharply pointed perianths. Both are useless and occupy space.

87. *A. patulus*. (March 8-April 16).

88. *A. paniculatus*. May 8. Parkside Mental Hospital. A coloured garden escape which appeared in the Parkside Mental Hospital grounds May 10.

89. A—*A. albus*. December 29-January 5, March 3-April 27, July 27. A common weed

in some places such as Beaumont. It flowers in summer like the other species. Its branches are spreading, the flowers rather small. It is of no value.

90. *A. muricatus*. December 19, February 1-April 10. This plant first appeared a few years ago on the Port Road, Cheltenham. It appeared later in a garden at Beaumont probably from seed from Cheltenham. It has a long rather thick penetrating tap-root. The branches tend to be semi-prostrate. The tap-root makes it hard to eradicate.

91. AA—*A. viridus*. November 7-April 27, July 27. Another common weed growing readily in Kintore Avenue, and many other places. Not harsh in texture like *A. retroflexus* and *A. patulus*. It is of no use.

MESEMBRIANTHEMUM FAMILY

92. A—*Cryophytum crystallinum*, Ice-plant. Common on the coastal sandhills near the sea, but unusual on the plains. A plant grew in the Exhibition Buildings in North Terrace, Adelaide, but perhaps it was not spontaneous here. Growing on Tapleys Hill Road near the Aerodrome on September 14.

93. *Carpobrotus edulis*. Fragrant but faint. The fruit is edible and the yellow flowers are showy. It was found growing near Tea-tree Gully on December 6. It also grows on sandhills near the sea.

94. *Galenia secunda*. December 14, February 1-April 29. Common near river at Port Adelaide, it also has appeared at Cheltenham, near the Mareeba Babies' Hospital and at Lockleys. At the latter place on April 29 it was visited by many blue butterflies.

PORTULACA FAMILY.

95. AA—*Portulaca oleracea* (Purslane). December 5-March 19. A common weed in gardens. It has prostrate, juicy, red coloured stems, and is used overseas (tropics) as a green vegetable.

CHICKWEED, CARNATION FAMILY

96. *Moenchia erecta*. Common in the hills but not often found on the plains. It was seen at Beaumont on October 8 with flowering just over.

97. AA—*Cerastium glomeratum* (Mouse-ear Chickweed). No smell. July 29-November 21. Readily distinguished from the

other chickweed by the hairs being all round the stem and in *S. media* they are only down one side of the stem. A small useless plant often abundant in waste land and unkempt gardens.

98. AA—*Stellaria media* (Chickweed). No smell. July 18-December 1, February 14. A similar small weed.

99. *Vaccaria segetalis*. A plant with rather a showy flower. It has appeared at Beaumont on December 1st, 1947.

100. *Silene Cucubalus* (Bladder Campion). November 2-17, January 29-March 27. Has appeared beside paths etc. at Northfield, Glen Osmond and Beaumont. Readily recognised by the bladdery fruiting part.

101. AA—*S. nocturna*. Very similar to the French Catchfly, but the fruiting capsule is nearly cylindrical instead of bulging. October 23, fruiting, North Terrace. November 9 at Beaumont.

102. A—*S. gallica* (French Catchfly) September 18-November 15. The sticky hairs catch minute insects which can usually be seen attached to them. It occurs in waste places. A pretty form with five red spots on the petals called var. *quinquevulnera* is seen occasionally in the hills.

RANUNCULUS FAMILY.

103. *Ranunculus muricatus*. October 17, Glen Osmond.

104. *R. repens*. December 28-February 12. Second Creek at Warland's Road, where it has descended from the hills.

105. *Adonis autumnalis* (Pheasant's Eye). Adonis has appeared spontaneously at Beaumont. It is a pretty little weed.

POPPY FAMILY.

106. A—*Papaver dubium* (Long-headed Poppy). September 15-December 9, January 8. The petals are brick-red. It occurs in waste places, in crops and in unweeded gardens, like the other weeds of this family.

107. A—*P. somniferum* (Opium Poppy). September 22-November 20, January 8. It is recognized by the large, juicy leaves being decurrent on to the stem. It grows in waste places.

108. AA—*P. hybridum* (Rough Poppy). September 14-November 17.

109. A—*Fumaria capreolata*. August 4, November 7. A climbing fumitory with whitish flowers with green points.

110. AA—*F. muralis*. No smell. May 24-31, July 11-December 19. A very common useless weed, sometimes so abundant in waste places as to give a dull reddish tinge to the vegetation, but it seems to be stretching a point to call this appearance smoky which the name *Fumaria* suggests.

111. A—*F. parviflora*. September 17-19, December 28, January 8. A fumitory with very small flowers.

CRUCIFERAE FAMILY

112. *Nasturtium officinale* (Water-cress). November 25, December 2-16. Common in the creeks in the hills and may be found in First Creek at Burnside.

113. A — *Sisymbrium officinale*. Faint fragrance. (Hedge Mustard). September 17-December 3. In the Hedge Mustard the pods are pressed up against the axils of the flowering stem. A useless weed not nearly as common as the Wild Mustard.

114. AA—*S. Irio* (London Rocket). August 7-January 7. This recent introduction became widespread in 1917. A specimen was found growing later by the steps of Parliament House.

115. AA—*S. orientale* (Wild Mustard). May 27-February 28. In Wild Mustard the pods are slender, rigid and curved, 2 to 4 inches long and spreading. It seems a useless plant.

116. *Brassica Tournesfortii*. Very faint fragrance. (June 8, November 8-January 3). This member of the turnip family has only appeared during the last 15 years or so. It is common in the dry interior along the East-West and North-South Lines. It has appeared more recently on the plains and also at Largs Bay.

117. *Sinapis arvensis* (Charlock). October 3-21. Glen Osmond.

118. AA—*Diplotaxis muralis*. Very sweet fragrance. Some plants flower all through the year but better after rain.

119. *Lepidium latifolium*. Fragrance like Alyssum December 14, February 1-April 29. In flower December 4. A recent introduction which has already spread extensively. It was first noticed in a paddock at Lockleys. Since then it has been seen at Unley and Goodwood near the Glenelg tramline. A useless plant.

120. *Lepidium Draba* (Hoary Cress, White Weed). September 25. This occurs

at Henley Beach, and plants have been found in the western suburbs as at Mareeba. The stem leaves clasp the stem whereas in *L. latifolium* they are stalked.

121. AA—*Capsella Bursa-pastoris* (Shepherd's Purse). June 1, August 7-April 24. The later flowering periods are due to the plants being watered. Shepherd's Purse is common in backyards and similar places. The leaves form a rosette at the base.

122. AA—*Coronopus didymus* (Lesser Wart-cress). September 30-November 5. A low spreading plant with an unpleasant smell.

123. *Rapistrum rugosum* (Wild Turnip). A few plants may be found in flower throughout the year. In full bloom on September 17-November 5. This weed is very abundant on waste land which it may cover thickly, and the yellow flowers may give quite a bright yellow tint to the fields. It is a useless plant left alone by horses.

124. *Raphanus Raphanistrum* (Wild Radish). No smell. April 27, September 18-November 17. It often occurs in fallow fields. The petals are white or pale yellow with violet veins. The pod breaks up into short segments each containing a seed.

124a. *Alyssum maritima*. June 12.

MIGNONETTE FAMILY.

125. *Reseda lutea* (Cut-leaved Mignonette). Faint fragrance, not quite pleasant. October 23-December 25. Plants have appeared at Knoxville and Firle.

ROSE FAMILY.

126. *Rubus fruticosus* (Blackberry). November 20-January 4. Occasionally plants may be seen on the plains near the foothills, the seeds being probably distributed by birds. The plants are hard to eradicate.

127. *Rosa rubiginosa* (Sweet Briar). December 6. Rare on the plains but common in the hills. The leaflets have glands beneath and on the teeth and so are sweet smelling when rubbed.

128. *R. canina* (Dog Rose). Pleasant rose perfume, sometimes faint. October 3-January 17. Common in places near the foothills. There are no glands on the leaflets. Hips deeply coloured.

129. *Crataegus Azarolus* var. *sinaica* (Neopolitan Medlar). September 30-October 23. This hawthorn has handsome red fruits larger than those of the common

hawthorn. It seems to have been originally planted at Beaumont. It has now been spread widely by birds at Beaumont and the adjacent hills.

130. *Poterium sanguisorba* (Sheep's Burnet, Salad Burnet). Doubtful faint smell, not fragrant. November 7-December 13. This fodder plant has appeared on Devereux Road and Burnside Road, Beaumont, and also on Highfield Estate.

ACACIA AND PEA FAMILY

131. *Acacia longifolia* (a Wattle). Has been noticed as a garden escape at Lockleys.

131a. *A. dodonaeifolia*. Erindale.

132. *Albizia lophantha* (Crested or Cape Wattle). May 24-August 14. A plant has been found near the Tasmore Post Office, evidently introduced.

133. *Lupinus pilosus*. April 9, September 5-November 7. This handsome blue lupin occurs spontaneously at Lockleys. Has appeared in Unley on waste land on which sand from the coast had been deposited.

134. *Ulex europaeus* (Furze). Probably some flowers occur throughout the year. They had been noted from May 8th to November 27, and on February 20. "Kissing's out of fashion when the gorse is out of bloom"—old saying. A nuisance in waste places. On higher parts only.

135. *A. — Cytisus canariensis* (Canary Broom). Slight fragrance, sometimes sufficient to be carried in the air. August 28-December 27. Very abundant in the hills and has appeared in gardens and waste lands at South Terrace, on the Portrush Road and at Mitcham.

136. *C. proliferus* (Tagasaste, Tree Lucerne). Some fragrance July 13. Modbury. This is a good fodder plant which appears spontaneously at places in the Mount Lofty Hills.

137. *A. — Trifolium procumbens* (Hop Clover). May 4, September 21-December 28. On watered lawns, December 30. A common clover of little fodder value. Appears with other clovers as a weed in lawns.

138. *AA—T. dubium*. September 23-December 13 and on watered lawns—December 30. A small clover with a few yellow flowers said by some to be the true Irish Shamrock.

139. *AA — T. fragiferum* (Strawberry Clover). November 29-March 4. On watered lawns April 7. Spreads by prostrate rooting stems. Common in lawns where it is difficult to eradicate. Pinker flowers than White Clover. The head when fruiting bears some resemblance to a strawberry.

140. *AA—Trifolium tomentosum* (Woolly Clover). September 17-November 28. Grows in Victoria Square.

141. *AA—T. resupinatum*. Identified by J. M. Black who says "but peduncles seem too short." October 9-December 4. This pretty little spreading red-flowered clover is common on the lawns along North Terrace and in Victoria Square.

142. *AA—T. repens* (White Clover). Fragrant, sometimes faint. September 10-April 14. Some may usually be found in flower throughout the year. Common in lawns in spring and, if watered, in summer also. It is a spreading and rooting species and a perennial, with white flowers whereas Strawberry Clover, somewhat like it, has pink flowers. Some consider this to be the Shamrock.

143. *AA — T. glomeratum* (Cluster Clover). October 6-December 17. The heads of flowers are sessile. This is a good fodder plant.

144. *A—T. subterraneum* (Subterranean Clover). Slight fragrance. September 19-November 30. This clover is a famous fodder plant.

145. *A—T. Cherleri*. Faint fragrance. October 17-December 7, March 2 (by roadside). Recognised by the ring of united bracts surrounding the flower head. It was first found growing at Beaumont but has now spread considerably. It has been found growing at Botanic Park.

146. *T. scabrum*. October 3-October 11. Widely spread at Linden Park and Beaumont. Rather a harsh clover.

147. *A—T. striatum*. November 23 (in the parklands near the Zoological Gardens).

148. *A—T. arvense* (Hare's Foot Clover). September 21-December 15, February 22 (one or two plants). A soft erect clover giving a pinkish tinge when masses are in flower together. Apparently of little value as a fodder.

149. *T. angustifolium*. October 30-December 29. A widely spread species with erect stiff stems and rather long leaflets.

The dry stems remain erect for a long time. When the autumn rains come the heads become soft and are relished by stock.

150. *T. lappaceum*. October 24-December 28. Beaumont Road, Netherby, Glen Osmond (usually in wet places).

151. *Trigonella ornithopodioides*. December 14. Growing luxuriantly beside Tapley's Hill Road west of the Airport; also in National Park where it is much smaller and prostrate.

152. AA—*Melilotus indica* (King Island Melilot). Very fragrant. September 5-slender erect yellow melilot. A good fodder but apt to taste the butter when cows feed on it.

153. *M. alba*. The peculiar fragrance may be carried some distance by the breeze. January 3 and 4. Growing beside the O.G. Bridge on the Torrens. A good fodder plant with a similar proviso.

154. A — *Medicago lupulina* (Black Medic). September 9, October 3-May 4 (on watered lawns in hot months). The pods tend to turn black hence the name.

155. AA — *Medicago sativa* (Lucern). Slight to moderate fragrance. October 30-April 29. The cultivated lucern often appears spontaneously.

156. *M. orbicularis*. Glen Osmond. In this and the next species the curled pods are more or less flattened.

157. *M. scutellata* (Snail Medic). Knoxville.

158. A—*M. tribuloides*. August 11 (in flower and fruits), October 3-November 20, January 4. Botanic Gardens, Colonel Light Gardens, Burnside.

159. A—*M. truncatula*. September 8-December 12, February 14, April 5-May 30. This and the former species are very like each other. The former has the spines less recurved than the latter.

160. AA — *M. denticulata* (Toothed Medic). August 1-June 4. A very common species with two or three turns of the curved pods.

161. A—*M. apiculata*. October 6-December 2. Like the preceding species but the spines are represented only by little knobs.

162. *M. lappacea* (Burr Medic). September 21-January 8. Beaumont. Good as a fodder.

163. *M. minima*. October 11-November 5. Beaumont.

164. AA—*Vicia sativa* (Common Vetch). No smell. The most common form of vetch in the Adelaide district seems to be a hybrid between *V. sativa* and *V. angustifolia*. This plant has the obovate leaflets of the former and the rounded pods turning blackish of the latter. August 3-November 15. Pods ripe October 22-November 8. Much relished by horses.

165. *V. angustifolium*. November 7.

166. A—*V. calcarata*. September 7-October 30. Beaumont Common. The large flowers are stalked.

167. *Glycyrrhiza glabra* (Licorice). December 22. Licorice has been found in flower on Hackney Road in a vacant allotment and adjacent pavement where its roots have been eaten by Saint Peters School boys for several generations. It also covers a vacant field near Payneham tram terminus.

GERANIUM FAMILY.

168. *Geranium molle*. October 23-November 26. This soft hairy little geranium, common in National Park has been found at Beaumont and Gill Terrace, Glen Osmond, but it probably prefers cooler climate than the plains.

169. A—*Erodium botrys* (Heron's Bill). June 27, August 1-November 20, February 15, March 3-22. A good fodder plant as is the following. Usually called "geranium" in the country.

170. AA—*E. moschatum* (Musky Heron's Bill). May 9-December 14. This plant is very common. It has been found in fruit as early as June 4. Much relished by stock.

OXALIS FAMILY

171. AA — *Oxalis cernua* (Sour-Sob). Fragrant. April 11 (April 27 near a leaking pipe), May 9-December 15. In full bloom from June 27-October 16, depending on season. Fields have been noted as yellow as late as October 16. The sour-sob is a garden introduction which has escaped and spread widely. It is not eaten in the green state but when dry horses seem fond of it. It is propagated to a considerable extent by bulbils. It sometimes has a juicy taproot which is semi-translucent and has a sweet taste.

172. *Oxalis variabilis* (One O'clock). August 3. A garden plant sometimes appearing spontaneously.

173. *O. flava*. Glen Osmond in Black's Flora.

LINACEAE.

174. *Linum gallicum*. Some fragrance. October 17-January 3, March 3. A delicate looking upright slender flax-plant with yellow flowers abundant on the foot-hills. Of no value.

175. *Linum usitatissimum* (Cultivated Flax). A plant appeared spontaneously on Devereux Road, Beaumont, on May 17.

POLYGALA FAMILY.

176. *Polygala myrtifolia*. July 19-April 15. A garden escape that is growing spontaneously at Beaumont.

EUPHORBIACEAE.

177. AA—*Ricinus communis* (Castor-Oil Plant). September 14-July 7, August 12. Has been found in flower all months of the year. This is the castor-oil plant of commerce and is found on waste land even within the city boundary. Its handsome seeds are violent purgatives and are poisonous.

178. AA — *Euphorbia peplus* (Petty Spurge). No smell. May 11-25, June 6-April 27. A common plant in gardens. Readily recognised by the milky juice. The juice may effect a photographic plate and has a slight curative properties for rodent ulcers.

179. A—*E. terracina*. No scent, or very faint. July 18-March 16, April 29, May 10. Some found in flower each month of the year, but most abundant from July-March. A nuisance on waste land especially near the coast and along the foothills.

ANACARDIACEAE.

180. A — *Schinus molle* (Pepper Tree). Seedlings have appeared occasionally amongst olives, etc., at Beaumont and along a fence in the Botanic Park, probably from bird distribution.

RHAMNACEAE.

181. *Rhamnus Alaternus*. August 7-October 2. Seeds of this hedge-plant are carried some distance by birds, probably mostly silver-eyes, so that young plants may appear spontaneously in olive plantations and other places.

MALLOW FAMILY

182. A—*Lavatera cretica*. April 1 (University Oval).

183. *L. arborea* (Tree Mallow). September 19-October 26. This has pink flowers somewhat like those of a hollyhock.

184. A — *Malva nicaeensis* (Mallow). September 10-December 12, February 19, April 9. Often affected with a rust (*Puccinia*). This and the following two species soon send down a long tap-root so that the plants are difficult to eradicate in gardens. Eaten as a secondary fodder by stock. This mallow has three broad bracts whereas in the next two species the bracts under the flowers are linear.

185. AA—*M. parviflora* (Mallow). March 16-January 14.

186. *M. verticillata*, which appears in the Second Edition of Black's Flora, differs from *M. parviflora* chiefly in being tall, (sometimes over 5 ft.) and a biennial or perennial. The dates under *M. parviflora* probably should be referred to this.

187. A—*Modiola caroliniana*. October 6-November 27. A pretty little mallow spreading and rooting and with brick red flowers.

HYPERICUM FAMILY

188. *Hypericum perforatum* (St. John's Wort). Rather faint fragrance. November 7 (in bud)-February 13. A few flowers on March 9-15 after heavy rain some days previously. Has spread its way from the hills to Tusmore where there are many patches of it.

MYRTLE FAMILY.

189. *Myrtus communis* (Common Myrtle). At Glen Osmond as a garden escape. The seed have probably been distributed by birds.

EVENING PRIMROSE FAMILY

190. A—*Oenothera odorata* (Evening Primrose). Very fragrant. Some may be found in flower all the year. Found at Mile End, Fulham and Beaumont. It is planted in country districts as a fodder.

UMBELLIFERAE.

191. *Conium maculatum* (Henlock, sometimes called Carrot Fern). This poisonous plant was found growing beside Hackney Road on October 17, 1946, but has since disappeared.

192. AA—*Foeniculum vulgare* (Fennel). October 2-June 27. Very common in waste places. It has a characteristic smell.

193. *Apium graneoleus* (Celery). December 28, Burnside.

PRIMULACEAE.

194. *Anagallis arvensis* (Scarlet Pimpernel). No smell. December 7-December 29, March 3-12.

195. *A. femina* (Blue Pimpernel). No smell. October 3-December 25, March 3, April 5. The two pimpernels are not uncommon in unweeded gardens.

PLUMBAGO FAMILY

196. *Statice psiloclada* (Sea Lavender). February 1, 1951, on the Port Road at Cheltenham. Common on the salt marshes of the Port River.

197. *S. occidentale*. December 14, towards Glenelg.

OLEACEAE.

198. AA—*Olea europaea* (Olive). October 18-November 30. Extensively seeded on the foothills and adjacent plains by starlings. Growing in the partly built walls of the "Temple" at the corner of Tavistock Street and North Terrace. Also near the Zoological Gardens.

GENTIANACEAE.

199. *Erythraea Centaurium* (Common Centaury). No smell. April 6, May 11, 18, September 17-December 26. Has been used for making a herbal tea.

200. *Microcala quadrangularis*. This small yellow, slender plant appeared at Highfield near Beaumont some years ago. It has not been seen recently.

APOCYNACEAE.

201. A—*Vinca major* (Greater Periwinkle). April 27-May 17, July 21-November 30. Has become a nuisance in some places by spreading extensively by runners.

ASCLEPIADACEAE.

202. *Asclepias rotundifolia* (Broad-leaved Cotton-bush). April 3-August 12. Near the foothills at Highfield, etc. The caterpillars of the Wanderer Butterfly eat the leaves and the pupae, green with golden dots, hang suspended on the plant. Not eaten by stock.

CONVOLVULACEAE.

203. A — *Convolvulus arvensis* (Lesser Bindweed). October 29-March 12. This

white convolvulus is a pest in many gardens and is difficult to eradicate, as the roots so readily break up into fragments which survive.

BORAGINACEAE

204. *Amsinchia angustifolia*. Woodville (in Black's Flora). Tranmere, December 25.

205. AA—*Lithospermum arvense* (Corn Gromwell). No smell. May 12, August 7-November 26. A rather harsh, upright weed in unkempt gardens.

206. A—*Echium plantagineum* (Salvation Jane, Patterson's Curse, Vipers Bugloss). Faint fragrance or none. A few found in flower throughout the year. The hills and fields are a beautiful blue from the abundance of its flowers between September 13-November 20, depending on the season. Young plants come up after autumn rains and soon form dense rosettes of broad leaves completely cutting out adjacent competitors. The name "Salvation Jane" is derived from the similarity of the flowers to the old-fashioned Salvation Army bonnets which were blue with red borderings. It is of some use as a fodder so that some have thought that the name "Salvation Jane" was given because it was a standby in times of drought. White-flowered forms have appeared at Highfield near Beaumont.

VERBENACEAE.

207. A — *Verbena supina*. October 24-February 15.

208. A—*V. sp.* May 12-November 25. A garden escape which has appeared spontaneously on Victoria Drive.

209. *Lippia canescens*. November 28-March 9. Used for lawns and has appeared spontaneously in places.

LABIATAE.

210. A—*Mentha viridis* var. *crispa*. March 30. A colony has established itself in the First Creek, Botanic Park. The plant has escaped from the Botanic Gardens.

211. *Lavandula Stoechas* (French Lavender). Faint fragrance apart from the leaves. December 2-February 10, May 11-June 2. Covering the Green Hill and has now descended on to the plains as at Erindale.

212. A — *Marrubium vulgare* (Horehound). December 14-January 3, March 1, 16, May 12. On waste land.

213. A—*Salvia verbenacea* (Wild Sage). Rather unpleasant Salvia smell. Some in flower all the year. It has a very long tap-root which is difficult to eradicate. Eaten by horses.

214. *Stachys arvensis* (Hedge Nettle). Doubtful faint fragrance. May 12-23, July 18-January 8, March 19. Sometimes it comes up abundantly in gardens, orchards, etc.

214a. *Melissa officinalis* Undelcarra.

SOLANACEAE.

215. *Solanum Sodomaeum* (Apple of Sodom). No smell. August 27-June 16. Common in waste places. It is very prickly. The dried fruits are carried by the wind when they disintegrate as the bitter apples do not seem to be eaten by birds.

216. A—*S. giganteum* Jacq. April 12-May 20, August 16-October 27. In grounds adjacent to Frome Road, A rather handsome shrub.

217. *Solanum elaeagnifolium*. February 12-March 7. Has established itself on the South Road on the Adelaide side of the Flagstaff Hotel and is present in adjacent vineyards, also at Colonel Light Gardens.

218. A—*Lycium ferocissimum* (African Boxthorn). January 4 (flowers and fruit). February 20-November 7. Abundant in many places and a great nuisance, as it harbours and feeds rats and sparrows and the spines may cause nasty punctures with the danger of tetanus.

219. *Physalis viscosa*. September 19-January 3. A colony has appeared by the roadside near the Flagstaff Hotel.

220. AA—*Datura tatula*. March 11-April 9. Reedbeds. A *Datura* appeared in Victoria Square in made soil, but did not flower.

221. A — *Nicotiana glauca* (Tree Tobacco). April 9-29, November 5-January 9. Near the Zoo, in the Botanic Gardens and at Lockleys. Has an unpleasant smell but contains hardly any nicotine.

FOXGLOVE FAMILY

222. *Antirrhinum Orautium* (Lesser Snapdragon). June 26-November 2.

223. A—*Linaria elatine* (Pointed Toad-flax) and var. *lasiopoda*. Doubtful fragrance. May 17-24, November 29, December 14-April 22. In the variety the flower stalk

is hairy. This plant may grow luxuriantly in unweeded orchards, etc. Sometimes called blanket weed.

224. *L. spuria*. February 15-April 6.

225. *Veronica hederifolia* (Ivy-leaved Speedwell). August 21, October 12-November 14. Glen Osmond.

226. *V. persica*. Aug. 15, September 11-November 14. Glen Osmond, Marceba.

227. AA—*V. arvensis* (Wall Speedwell). September 17-November 24. Hindmarsh Square, opposite the Archives Department on North Terrace, Beaumont.

228. *Bartschia latifolia*. October 12-November 6. This plant is parasitic on adjacent weeds. It has small purplish red flowers.

228a. *Verbascum* sp. Undelcarra.

PLANTAIN FAMILY

229. AA — *Plantago lanceolata* (Rib grass). Very faint sweet smell or none. August 21-April 27, June 4-23. Full flower December 6, February 13. A nuisance in the lawns on account of the moderate tap root and the rosette of leaves.

230. A — *P. Coronopus* (Buck's-thorn Plantain). Very faint sweet smell or none. April 29, Nov. 16-Dec. 29. Common in the sandy soil near the sea. On the plains it has been found on Frome Road, at Springbank and at Fulham towards Glenelg.

231. A—*P. major* (Greater Plantain). December 13-March 16, April 12. It has been found at the University, Burnside, and Lockleys. Requires damper conditions than *P. lanceolata* and so is more often found in the hills.

RUBIACEAE

232. AA—*Sherardia arvensis* (Field Madder). No smell. September 10-November 28. A common small plant with little mauve flowers often abundant in uncultivated places.

233. AA — *Galium tricornue*. November 21. Common along roadsides in the hills. One plant found on a footpath in Grenfell Street.

234. AA—*G. murale*. September 7-December 4. A common small weed with weak stems and leaves in whorls of four or five. The fruits are in pairs and reflexed. Common in waste ground.

DIPSACACEAE

235. *Scabiosa maritima* (Purple Pin-cushion). Faint fragrance. February 20, April 8-June 9, August 11, September 9-December 28. Tasmore, Modbury, Colonel Light Gardens. Very common by the roadside towards Reynella. The flowers vary from white to lilac and dark purple and are quite pretty.

CUCURBITACEAE

236. *Ecballium Elaterium* (Squirting Cucumber). September 20-May 5. In the Mitcham Railway Yard and an adjacent roadway and in the yard of the Adelaide Railway Station. The cucumber when ripe and disturbed separates from its stalk and projects seeds on to surrounding objects, frequently hitting people.

237. *Citrullus vulgaris* (Wild, Bitter or Bastard Melon). April 9. This is the cultivated melon gone wild. Though bitter it is apparently eaten by stock in the North.

238. *Cucumis myriocarpus* (Paddy Melon). February 23-March 15. Occasional plants at Enfield and Parkside. Very common in sandy soil near the coast. Supposed to cause blindness in horses in the interior, but this is doubtful.

COMPOSITAE

239. A—*Aster subulatus*. March 21, April 9-May 7. In King William Road near the City Baths; also found in a storm channel at Lockleys.

240. AA — *Erigeron crispus*. Some in flower all the year. Common along footpaths even in the city. Looks somewhat like the stinkwort but without the characteristic smell.

241. A—*Xanthium spinosum* (Bathurst Burr). December 29, January 31-April 12, May 8. On roadsides and in waste land. The hooked spines on the fruiting heads catch in clothing and in sheep's wool, in the latter case causing trouble.

242. *Galinsoga parviflora*. December 29. March 16, May 25. Burnside.

243. *Achillea tomentosa* (A Milfoil). December 6. A colony has become established by the roadside at Hope Valley.

244. A — *Senecio vulgaris* (Common Groundsel). August 8-December 19. Common in unweeded gardens. Good food for canaries.

245. A — *Senecio pterophorus*. A single plant of this recent introduction, so common now in our hills, appeared in 1951 in the University grounds near Frome Road but was cut down before it flowered.

246. *Senecio Mikanoides* (scandins). This scrambling ivy-leaved *Senecio* with yellow flowers is common in the hills. It has also appeared at Burnside near the creek.

247. A—*Calendula arvensis* (Field Marigold). March 11-September 13, October 26, December 3. Is present in the University grounds and other places.

248. *Osteospermum moniliferum*. Doubtful faint fragrance. July 28, August 27-November 2 with a few flowers to December 7. Very abundant at Belair, overwhelming the native vegetation and spread in parts by birds, probably starlings. Has appeared in places on the plains such as Burnside near the Tasmore bus terminus, at Kings Park and at Lockleys. A nuisance but easily eradicated.

249. AA — *Cryptostemma calendulaceum* (Cape Dandelion). July 20, August 22 (a few out), September 3-December 14. Common, but not so common as 50 years ago. Sometimes when in massed flower giving a yellow tinge to fields. A second class fodder.

250. A — *Inula graveolens* (Stinkwort). March 21-May 18, a few flowers to June 4. In the 1880's and 1890's, fields near Adelaide were densely covered with it, but it is now much less abundant. It causes trouble in sheep sometimes when, in the absence of grass, too much is eaten.

251. AA — *Cynara Cardunculus* (Globe Artichoke, Cardoon). Moderate fragrance. July 3 (one flower seen), October 3, November 17-February 16. Occasional flowers especially after rain up to March 3, May 21. The leaves die off but grow again after the first rains. A seedling in the ground of Scots Church, North Terrace, was chopped out. A very handsome but prickly plant when in full bloom, with beautiful blue flowers. It is a wild form of the cultivated artichoke, the bracts of whose flowers are eaten. There is much nourishment in the seeds which are eaten by goldfinches and by stock when the heads have been softened by rain.

252. *Cirsium lanceolatum* (Spear Thistle). Faint fragrance. February 14-April

12. Common with other thistles in uncultivated places.

253. A — *Carduus tenuiflorus* (Slender Thistle). No smell. October 5-December 28. East park lands, Beaumont, common in the hills.

254. A — *Silybum Marianum* (Milk Thistle). August 1-December 28, February 22. Also commoner in the hills. The name Milk Thistle is derived from the white veins mottling the leaves.

255. *Centaurea melitensis* (Maltese Cockspur). December 22. This cockspur with yellow flowers is not common on the plains but common in country districts.

256. A — *Centaurea Calcitrapa* (Star Thistle). November 22-June 14, with occasional flowers in July, September and October. This purple flowered thistle is common by the roadside. Goldfinches eat the seeds.

257. *Carthamnus lanatus* (Woolly Star Thistle). December 1-April 26. Gets its name from the woolly appearance when the fruits are ripe. Has been common at Highfield near Beaumont and also in country districts.

258. A — *Cichorium Intybus* (Chicory). Some in flower all the year, but chiefly in the late summer. The pale blue flowers make it readily recognized. Common along streets and in waste places. The wild form of the chicory of commerce.

259. *Hedypnois cretica*. October 2-November 21. This yellow flowered plant is common in many places.

260. AA — *Hypochoeris radicata* (Rooted Cat's-ear). No smell. October 29-July 5, July 11. Has a rosette of leaves and a long taproot so that it is a nuisance in lawns. Commoner in the country. Is a second class fodder.

261. *H. glabra*. August 10. (This record requires checking.)

262. A — *Tragopogon porrifolius* (Salsify). October 3-May 11. A rather handsome flowered plant with long fruiting stems and fruit with golden brown plumose bristles on the top of the long beaked achenes and with a milky juice. A wild form of the

cultivated plant. Has a rather parsnip-shaped elongated root.

263. *Scorzonera laciniata*. December 13. Beaumont. Appears occasionally in various parts of the state. [Scorzonera, Black salsify or Viper's grass, a plant with parsnip-like root used as vegetable. [It., prob.†, scorzone adder "because it doeth heale the bytinges of this beast"]—The Concise Oxford Dict.

264. A — *Picris echinoides* (Ox-tongue). All the year, flowering abundantly in the summer and autumn. Rather a scrambling harsh-leaved plant. Looks somewhat like a sow thistle.

265. AA — *Taraxacum officinale* (Dandelion). Some in flower probably all the year, but in summer on watered lawns. Common along North Terrace. The leaves are supposed to resemble in shape the teeth of a lion. When mowed down the flowering stalk with its yellow flowers spreads laterally but becomes erect when the seeds are ripe, so as to be readily disturbed by any animal knocking against the plant. The seed blows away suspended by the silky bristles of the pappus at the end of the filiform beak of the achene.

266. A — *Lactuca saligna* (Willow Lettuce). May 12.

267. AA — *L. Scariola* (Prickly Lettuce). December 20-June 3. A few plants were found adjacent to Frome Road in the summer of 1944 and 1945. Has now become widespread. A young plant was even found growing on the steps of Parliament House on January 14, 1951.

268. AA — *Sonchus oleraceus* (Sow-thistle). Moderate fragrance. All the year. Relished by stock. Poultry and canaries like the heads.

269. *S. asper* (Prickly Sow-thistle). No smell. October 3-November 30. Common in the country districts and the hills, but not common on the plains. Has appeared at Beaumont and Hope Valley.

270. *Crepis virens*. No smell. December 30-January 4. This plant looks somewhat like a small form of the Rooted Cat's-ear, but there are glandular and simple hairs on the bracts. Common in the wetter climate of the hills. Has appeared in watered lawns at Beaumont and Springbank.

A NEW RECORD FOR SOUTH AUSTRALIA

(14th January, 1952)

By KEN DUNSTONE.

Several years ago the writer noticed an abundant growth of the red dead-nettle in a market garden beside Fourth Creek at Norton Summit. It appeared to be in sufficient numbers to say that it was established there. Its name is *Lamium purpureum*, of the family *Labiatae*, that is, the sage and mint family.

The fact that introduced plants sometimes turn up in quite unusual places provides much food for thought as to how they get there. It is possible that many are unwittingly taken about by man himself, often in the seed which he used for pastures and various crops. Many are definitely escapes from gardens, and frequently succeed better as such. Some are carried about by animal agencies, especially birds, particularly the berry- and seed-eating types and the wading types, these last being very obvious examples. In fact, this avian method of plant spread furnished a most fas-

cinating theme of research for Darwin, who raised a large number of plants from seeds in the mud adhering to the feet of birds.

The same field of investigation could be exploited very profitably in this State by someone prepared to go around taking a census of the plants growing in and around man-made water-holes and water-courses. An analysis could then be made of the lists, in the endeavour to determine which were air-borne, which were taken there by animals and birds, and so on.

It would, of course, be essential to know the botanical name of every plant found, so that this would act as a compelling urge to remember the names of all the plants in a given locality.

This is one systematic way of finding new plants. Naturally, it is always best if the discovery be a native plant; nevertheless, it is useful to know what is growing in our State in the way of introductions.

ANOTHER NEW PLANT FOR SOUTH AUSTRALIA?

On January 5 of this year, what is believed to be a new record for this State was discovered in the bed of the River Torrens, a little way above Castambul. It is the plant called pickerelweed, an introduction from North America. Its botanical name is *Pontederia cordata*, and it belongs to the family *Pontederiaceae*.

The very interesting point about this find is that it is in the same family as the notorious water-hyacinth (*Eichhornia*), which is so well known for its rapid spread along the River Murray from the Ramco Lagoon, in 1937. It remains to be seen whether this new introduction spreads as quickly, although this is rather doubtful, as the quick growth of the water-hyacinth is due largely to its horizontal shoots, or stolons, which radiate from it in all directions, while the main means of propagation of the pickerel-weed is by means of its thick underground (or under-river) root or rhizome.

—K.D.

THE WALL FLOWER AS AN ANTIBIOTIC

Mentioning that one of the exhibits contained in Gerard's *Herball*, Sir Howard [Florey] pointed out that among the illustrations was the wallflower. "If you take any part of the wallflower, its stem, seed or leaves, and grind them up, the liquid in which they have been drowned is a very powerful antibacterial. It is much more powerful than carbolic, and was certainly used in the Middle Ages and possibly earlier, as a poultice to apply to inflamed parts. There is some connection between the herbalist and the type of pharmacy now being done."

Sir Howard Florey, when opening an Exhibition illustrating the History of Pharmacy at the Wellcome Historical Medical Museum, London, on May 8, 1951.

(Vide: British Medical Journal, June 9, 1951, p. 1322).

—J.B.C.

EXCURSION—"WILD FLOWERS —CARIPOOK"

Spring hid none of its charms from members and friends attending the outing at Carripook on Saturday afternoon, 8th September, 1951.

It was a perfect day, with wild flowers in abundance among the scrub bordering the route taken after crossing the main road from the Station, so there was no need to leave the track to observe the show blooms of *Epacris impressa*, *Hibbertia stricta*, *Grevillea lavandulacea*, *Astroloma conostephioides* and *Tetratheca pilosa*, or the sweet smelling *Hakea ulicina* and *H. rostrata*. Only one plant was found of *Anguillaria dioica*, the well known harbinger of Spring.

Drosera whittakeri with its large white blooms formed a delightful picture when found in groups, and the star like beauty of *Leucopogon virgatus* was apparent as we found its tiny white flowers sprinkled among the taller shrubs of *Leptospermum scoparium*. We noticed that this *Leptospermum* was the only plant in the district which had been prevailed upon by the dodder, *Cassytha glabella*. *Pimelea stricta* and *Pultenaea daphnoides* were bountiful, but not yet in bloom.

Departing from the track we discovered the graceful *Stackhousia monogyna* and the dainty *Hybanthus floribundus*, then came upon two species of *Daviesia*—*D. brevifolia* and *D. ulicina*. Although lacking the bright colour of many shrubs, *Spyridium thymifolium* when in flower, has a loveliness only noticeable when it is studied closely, as from a distance one is likely to pass it by.

It was a thrill when one member chanced upon three blooms of *Caladenia deformis* and another found a single *Diuris maculata*. *Craspedia uniflora*, *Platylobium obtusangulum* and *Logania recurva* were plentiful.

The yellow of the wattle made a splash of colour, and four species were observed—*Acacia verticillata*, *A. myrtifolia*, *A. vomeriformis* and *A. verniciflua*.

It was noticed with regret that some new residents of the vicinity had absolutely denuded their land of God's garden, and were trying to plant one of their own. Will these people never learn to appreciate the beauty and usefulness of the native flora?
—N. L. HARRY.

MOUNT BOLD EXCURSION— 8th OCTOBER, 1951

The all-day excursion to Mount Bold on Monday, 8th October, was well attended. The day was both pleasant and interesting. Water was flowing over the spillway of the reservoir, and much of botanical interest was found.

Professor J. B. Cleland was present and supplied the following data:—

"On the roadside near Crafers the spread of the recently introduced *Senecio pterophorus* was noticed. A stop between Longwood and the first bridge over the Onkaparinga, where the road ran along the top of the ridge, yielded specimens of the pretty little pink Myrtle *Baeckea ramosissima*, one of the few stations for this in the Adelaide hills.

Lunch was held on the Kuipto side of the first bridge over the Onkaparinga approaching Mount

Bold from Longwood. A number of ephemeral plants were found in flower, such as the two *Levenhookias*, *Aphelia*, *Hydrocotyle*, the introduced pretty little delicate yellow-flowered *Microcala quadrangularis*, now widely distributed, but when Part IV of Mr. Black's flora appeared it was considered as scarcely naturalized."

A visit was paid to the reservoir itself, and then the high light of the excursion was a bit of natural scrub, on rather sandy soil, by the side of the Mount Bold road near Kangarilla. Here was found *Adenanthos*, *Boronia coerulescens* (abundant), *Conospermum patens*, *Lobelia rhombifolia*, the sweet scented herb *Zieria veronicea*, *Lepidobolus*, *Dillwynia floribunda*, *Stylidium calcaratum* and other interesting plants.

This would be a most desirable spot to have as a reserve. Perhaps the Local Council and the School might both be encouraged to take an interest in it, and try and secure this ground for this purpose.

Afternoon tea was taken at the Cherry Gardens' turn off from the Clarendon Road, and here was seen again the daisy *Brachycome diversifolia*, so rare in the Adelaide hills but found for the first time in the upper part of South Australia on this very spot during a Field Naturalists' Excursion about 25 years ago. The rather uncommon *Erechtites hespidula* also grew here. Altogether the excursion was a pronounced botanical Success."

During the lunch break Professor Cleland mentioned that he was making a further survey of plants in the Hundred of Kuipto. This turned the discussion to the origin of the term hundred.

Mr. H. A. Bailey, Acting Chief Surveyor of the South Australian Land Department has supplied the following information:—

The origin of the word hundred as applied to an area of land is obscure. There are two possible meanings: the first, an area capable of supporting one hundred warriors or serfs for an Over Lord; the second (the English meaning), an area able to support one hundred families.

Col. Light, on 9th March, 1836, was instructed to divide the colony of South Australia into towns and counties.

The first reference to a hundred in S.A. was Charles Bonney's recommendation in 1846 that the counties be divided into hundreds. The first hundreds were proclaimed on 29th October, 1846. In 1860 Charles Bonney, then Commissioner of Crown Lands, gave evidence in an inquiry that, as far as he could recollect (there is no evidence to support this statement), the size of a hundred had to be one hundred square miles. It could be up to $\frac{1}{3}$ more than one hundred square miles (apx. 133 sq. mls.), or $\frac{1}{3}$ less than 100 square miles (apx. 67 sq. mls.).

In South Australia there are hundreds of all sizes. Darling, in County Frome, is one of the smallest, with 19,000 acres, and Bookpnrong, on the River Murray near Loxton, is one of the largest with 194,000 acres.
—M. DAVIS.

EXCURSION TO WATERFALL GULLY—13th OCTOBER, 1951

The small party walked down the old timber track which leaves the road beyond the lookout. Owing to the recent rains flowers were plentiful, and the orchids were especially beautiful. The

large blue *Glossidia major* grew in thick driits. The Spider Orchid, *Caladenia Menziesii* and *Caladenia Cairnsiana*, and the large *Diuris longifolia* were everywhere, the last forming thick carpets through the bush. There were also patches of *Diuris palachilla*.

We descended to the creek above the third fall to see the Coral Fern (*Gleichenia circinata*), the Sword Fern and the Maiden hair Fern (*Adiantum aethiopicum*). We then followed the creek down to the kiosk.

A species of *Patersonia* was found near the Second Fall. The graceful *Marianthus bignoniaceus* was climbing on shrubs at the water's edge above the Third Fall. Several species of *Lomandra* were in flower, and a species of *Stellaria* was plentiful.

Tetratechea, *Goodenia*, *Hibbertia*, *Pultenaea*, *Dillwynia*, *Grevillea*, *Pimelea* and many other genera made splashes of colour everywhere. The vigour of many introduced plants was striking, especially below the kiosk:—Hawthorn, Olive, Lavender, Salvation Jane, Onion Weed, Onion Grass and the large pink flowered *Oxalis*. The last three were also found well above the kiosk not far from the main road. Three species of *Solanum* were noted and the ever present *Sparania*.

The introduced plants in the lower foot-hills seem to be more vigorous than the native flora.

—M. DAVIS.

EXCURSION TO A HIGH RIDGE AT NATIONAL PARK ON SATURDAY AFTERNOON, 20th OCTOBER, 1951

The party alighted at National Park railway station in cool spring weather, and a "ridge" being indicated on the programme, a decision was made to climb the nearest one.

Crossing the railway line, and negotiating a particularly well-kept fence, the party was faced with the possibilities of an extremely steep ascent.

The first delight was a large colony of Maiden Hair Fern (*Adiantum aethiopicum*), in all its spring glory of long and delicate fronds. Here the green hillside was dotted with brilliantly yellow buttercups.

The climbing now became more arduous, but the slower progress was an aid to treasure-finding. The Liliaceae family was well represented on this sheltered slope. The blues of *Dichopogon strictus* and *Caesia vittata*, were plentifully interspersed with the yellow of the *Bulbine bulbosa* and the white of the *Burchardia umbellata*.

The "Australian Bugle Flower," *Ajuga australis*, a Labiatae having sky-blue flowers gained much admiration, as did also *Glossodia major*, which grew here in profusion.

The party now gradually separating into groups, gave loud calls to attract others, which greeted the finding of orchids. Particularly beautiful, was the spider orchid, *Caladenia dilatata* in large colonies of fine blooms and long stems.

Less frequent was *Caladenia carnea*, and in sheltered spots were small groups of *Caladenia Menziesii*. *Calochilus Robertsonii* was a heartening reward for clambering up to the ridge-top, but *Thelymitra pauciflora* were all resolutely shut for the afternoon for lack of sunshine. At least seven

different orchids were found on this ridge, in community with other flora, *Tetratechea pilosa*, and also a large patch of *Acrotriche fasciculiflora*.

There being no density of vegetation, the spring flora was displayed in all its colourful beauty, which was a joy to see as we rested after the long climb.

Returning by a different track, there were fresh findings. *Scaevola microcarpa*, a prostrate plant of pale lavender flowers was decorative to hillside and railway banks. Of the same family was *Goodenia primulacea*, which with *Stackhousia monogyna*, *Pimelea humilis*, and the cushion-like *Hibbertia*, contributed to the yellow, in the colour scheme of yellow and blue of the spring display. *Brunonia australis*, a blue button flower of superb beauty, grew among tall "Billy Buttons," *Craspedia uniflora*, and "Yam," *Microseris scapigera*.

Descending to the damper slopes, the ground was covered with *Acaena ovina*, of the Rose family, which, until its seeds ripen and become troublesome, has the merit of possessing decorative shiny green foliage.

Stepping out over small streamlets and rocky pathways, where Rock Fern, *Chelidanthus tenuifolia*, was now having its spring display, and passing through high bracken fern, we eventually reached the station.

Here there was leisure to gaze on all sides at the magnificent vistas of the National Park, wishing fervently that it would remain in its present virgin state, as a permanent gift to the people.

—H.M.S.

EXCURSION TO RAZOR-BACK RIDGE—5th APRIL, 1952

Ecology is the branch of botany, which deals with the environment in which plants live. With native plants the two most important factors in that environment are the climate and the soil. In the scrubs which we usually visit, such as at Stoneyfell and Mount Lofty, the basic rock is quartzite, and the soil in consequence is of a sandy nature. This soil environment gives us the dominant shrubs *Acacia myrtifolia* (Scrub wattle), *Pultenaea daphnoides* (Large-leaf bush pea), *Epacris impressa* (Common heath), *Astroloma conostephioides* (Flame heath), and *Banksia marginata* (Silver Banksia).

But in the Razor-back ridge locality the basic rock is shale, which by weathering gives a heavy red clay soil. So we found as the main ingredient of the flora quite a different type of scrub in *Olearia tubuiflora* (Quill daisy bush), a dense shrub up to 3 ft. high and 4 ft. wide, with *Astroloma humifusa* (Cranberry heath), *Hibbertia stricta* (Erect guinea flower) as undershrubs, and an occasional specimen of *Acacia pycnantha* (Golden wattle).

Then as to the climatic aspect of ecology, the side of the gully we examined faced east and was studded with the rough barked *Eucalyptus obliqua* (Messmate stringybark), which requires a fair amount of moisture. But the other side of the gully, which faces west, and so is subject to the heat of the afternoon sun was beautified by the clean white stems of quite another species, *Eucalyptus fasciculosus* (Pink gum), which can flourish in more arid conditions.

(Continued on page 63)

— Obituary —

PROFESSOR T. HARVEY JOHNSTON

By the death on August 30, 1951, of Professor Harvey Johnston, Australia lost one of its most distinguished and energetic zoologists and naturalists; South Australia a helminthologist, a marine and riverine biologist, our University its Professor of Zoology since 1922, the Royal Society a past President and for some years a very able Honorary Secretary, and this Section a supporter who was always ready to place his experiences—in the Antarctic with Sir Douglas Mawson; in his journeyings to out-of-the-way parts of the world in search, eventually successful, of a parasite to control prickly-pear; and on various anthropological expeditions into Central Australia—at the disposal of the Field Naturalists in the shape of well-illustrated lectures. His last public act of importance was before this Section on August 20 when, at our request, he presented, on behalf of the Field Naturalists' Club of Victoria, the Natural History Medallion for 1951 to Mr. B. C. Cotton. On that, and on other recent occasions, he was accompanied by Mrs. Johnston who kept a watchful eye on his activities to reduce as far as possible any undue stress. His acquaintance with the Australian fauna was very extensive, embracing more particularly parasitic worms (on which he was a world authority) and parasitic protozoa, the flies responsible for the blowing of sheep, the insects attacking prickly-pear, the marine animal life of the Antarctic, and the microscopic fauna and flora of the Adelaide water-supply. As a colleague and friend of more than forty years, standing, who has seen his career open out into such varied avenues of outstanding research as fell to his lot, I can speak very appreciatively of his scientific attainments, I know his high code of ethical behaviour, and I feel great-

ly the loss of a friend so helpful and so considerate on the various expeditions when we were associated together.

—J. B. CLELAND.

JOHN McCONNELL BLACK, A.L.S.

J. M. Black's *Flora of South Australia* is known probably throughout the botanical world. It is a textbook in the University of Adelaide and almost the daily companion of the systematic botanists of the other States. Part I of the First Edition was published in 1922, and the concluding Part IV in 1929. Black re-examined specimens of every one of the species accessible to him so that the descriptions represent his own individual observations. It soon became necessary to revise this work, owing to the large number of accessions that time and research had meanwhile brought to light. Mr. Black undertook this arduous task and Part I (Second Edition) appeared in 1943, and Part II in 1948. Those who have seen his annotated copy of his first edition realise how much work this entailed and how thorough the revision was. Towards the end of 1951, the Committee responsible for the issue of this and the other Handbooks of the Flora and Fauna of South Australia decided that Part III should be concluded somewhere about the Primulaceae or Plumbaginaceae. On the evening of Saturday, December 1, 1951, Mr. Black, then in his 97th year, completed the last-named family, leaving several Floras open on his table which he had been consulting on the genus *Statice*. He rested in bed on Sunday morning and after getting up died suddenly early in the afternoon.

It must be of interest to many naturalists to know that J. M. Black was in an important way responsible for the inauguration of the long series of Handbooks issued by the South Australian Branch of the British Science Guild and including such other valuable works as the Mammals by F. Wood Jones, the Reptiles and Amphibians by Edgar R. Waite, the Fishes by the same author, and the Vegetation by J. G. Wood. When I returned to South Australia in January 1920, the only available work describing South Australian Plants was Professor Ralph Tate's Flora. This work was out-of-date and rather inadequate. A new Flora was eminently desirable and I particularly wanted one. J. M. Black, a youngish man then of about 65, who had retired from Hansard, had already made a name for himself by his study of the South Australian Flora, and had contributed instalments of Additions to the Flora of South Australia to our Royal Society. The British Science Guild was at this time, just after the conclusion of World War I, seeking avenues to encourage the use of scientific knowledge. I put a proposal to the South Australian Branch that it should undertake arrangements for the preparation by specialists, working in an honorary capacity, of Handbooks dealing with the Flora and Fauna of South Australia and that the Government might be approached to see whether, if these Handbooks were so prepared and offered free to the State, the Government would arrange for their publication and sale at cost price, on a kind of pound for pound basis. The Branch approved of the suggestion, and a deputation composed of Professor F. Wood Jones,

Professor T. G. B. Osborn and myself waited upon the Premier. Fortunately, I had prepared a type-written sheet outlining the proposal. This was handed to the Premier of the day, Sir Henry Barwell, who read it through and then, turning to us, said: "A very generous offer, gentlemen. I shall lay it before Cabinet." In a few days, we received a request for further details which were approved by the Government, and Mr. Black was then asked whether he would undertake the preparation of a Flora of South Australia.

Almost the last occasion in which he appeared before our Section was in 1945 when, on behalf of the Field Naturalists' Club of Victoria, the Natural History Medallion for 1944 was presented to him. On that occasion, the speakers were loud in their encomiums of him and his work, and the intervening years have added materially to our debt to him. With his passing away, we feel botanically lost, having no one with his authority to whom to appeal when possible new species or new introductions have to be considered. Full accounts of his life and scientific activities will appear in "Herbarium News" by Miss C. Eardley, and in the Proceedings of the Royal Society of South Australia. Here we can but record how much we, as naturalists, appreciate what he had done for us over the years, with thankfulness that he was spared for so long and died so peacefully without serious inconvenience from his advanced years, and with regret that he did not live to see his revision of Part IV in print, though the text is mostly prepared.

—J. B. CLELAND.

NATIVE PLANTS GROWING ALONG-SIDE A RAILWAY LINE

(continued from page 44)

is closely related to the aboriginal food-stuff, nardoo.

All these finds have been made in the last few years.

So the botanist who keeps his eyes open even during the prosaic business of travelling to work, or wandering about in the most unpromising places trying to kill time, as is sometimes necessary, never knows what surprises may greet him next.

EXCURSION TO RAZOR-BACK RIDGE

(continued from page 61)

To this may be added the ecological effect of seasonal variations in that this year almost all the gums, excepting the stringybarks and peppermints have their stems clean and bright and their leaves fresh and green. For this is due probably to the unusual heavy rain in February of this year. And this phenomenon was very noticeable on the way home in the rows of sugar gums along the Norton Summit road above Magill. They were indeed a delightful spectacle for nature lovers, and a grand finale to a beautiful and profitable day.

—EDGAR W. PRITCHARD.

ANNUAL REPORT OF THE COMMITTEE OF THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY (INC.) STH. AUST. FOR THE YEAR 1951-1952.

I have much pleasure in presenting, on behalf of the Committee the following report for the year ending 30th June, 1952.

Members.—We have 220 ordinary members (of which only 180 are financial), 10 life members, and 6 honorary members, making a total of 236. During the year 31 new members joined our ranks, a number of them being young people, it is pleasing to note.

The Section suffered great losses in the deaths of Professor Harvey Johnston, Mr. J. M. Black and Mr. J. Ferries, who, in his will left the Section estate valued at a considerable sum.

Mr. J. M. Black, you will recall, was awarded the Australian Natural History Medallion for the year 1944.

Excursions.—During the year 48 excursions were held, including some localities which had never been visited before, at least, not by members present.

General Meetings.—An average of 43 members and visitors attended the following monthly general meetings:—

August 21st—Presentation of the Aust. Natural History Medallion to Mr. B. C. Cotton.

September 18th—Aboriginal Campsites — Dr. Cooper Black.

October 16th—Film Evening — Messrs. Anderson and Sandercock.

November 20th—A Visit to Europe illustrated — Dr. Best.

February 19th—Nature Films — Mr. Moore.

March 18th—Aspects of Evolution — Mr. J. Mitchell.

April 15th—Coloured Slides — Mr. Stevens.

May 20th—Native Plants, their Cultivation and Future — Mr. T. R. N. Lothian.

June 17th—Desert Insects — Mr. G. Gross.

All of these evenings were most instructive and interesting, and the Committee records the thanks of all members to those who gave us these lectures.

Arbour Day.—This was held on 19th April, in the Flora Reserve, National Park, when about 14 species were planted. A good attendance of members helped greatly in the work. Funds were made available from the Conservation Fund with which to purchase the plants. After the planting, Mr. Lothian who convened the function instructed the party in the recognition and control of *Osteospermum moniliferum*, sometimes called the "necklace daisy."

Wildflower and Nature Show.—A very successful Wildflower and Nature Show was held on 5th and 6th October in the Liberal Club Hall. Much of the credit for it was due to Mr. Lothian, who once again organised the show in his usual vigorous and enthusiastic fashion. He was ably assisted by a small band of keen members. Miss Waterman's shell ornaments, Miss Gregor's robin redbreasts and the excellent work done by those on the flower stall augmented the proceeds of the show.

An outstanding feature of the show were the unusual plants displayed there, including a number of the remarkable West Australian wild flowers, and the W. A. Pitcher plant; also the "ant-plants" from North Queensland, kindly loaned by the Botanic Gardens. Sincere thanks are due to Miss Ashby, Miss Burdett and Mr. Payne, who again supplied excellent collections of flowers from their gardens. Thanks, too, are recorded to T.A.A. for carrying free of charge, flowers from interstate, a fact which materially contributed towards the success of the show. To the press and radio who again greatly assisted in the publicity of the show, to the Director and staff of the S.A. Museum for exhibits; Technological Museum for exhibit of pearls; School of Mines for glass cases; and to all those members who assisted in the many ways possible; the Committee records its thanks.

The emphasis of the show was on native plants under cultivation, and a poll was held to find which of the flowers displayed the public enjoyed most. This was an interesting feature, and together with the lists of Australian plants for Adelaide, which were supplied free to all who visited the show, did much to stimulate interest in our native plants.

The "South Australian Naturalist."—Only one part of the "S.A. Naturalist" was published during the year under review. Mr. G. Buick, who was again appointed Hon. Editor, resigned later due to pressure of work, and the position was filled by Mr. Lothian. Preparations are now in hand for a further issue of the present volume, and this should be available shortly. We would point out that reports of excursions are requested for publication.

Advertising.—An extensive advertising campaign has been going on for some time, the main object of this being to get more young people into the Section. A certain amount of success must be recorded, and for this our thanks are due to the co-operation of Station 5KA, the W.E.A., the Zoo, Public Library and the S.A. Museum.

Clubs.—Those clubs functioning have reported a satisfactory year's work, but membership of these clubs is not as great as the Committee would like it to be.

General.—It is heartening to note the influx of new members, although a number of resignations have been received during the year. The future of the Section appears bright, but we appeal to all our members to take a part in the Section's activities. This can be done by bringing along more exhibits to our meetings and recording nature notes or items of interest and reports of excursions and general papers for publication in the "S.A. Naturalist."

Whilst our financial position is at present satisfactory, due principally to the successful Wild Flower and Nature Shows, the costs of printing the "S.A. Naturalist" are heavy. With continued rising costs economies are made wherever the Committee considers possible, but members must realise your Committee's concern over these matters. New members are the backbone of the Section, and we must all try and obtain more to swell our ranks. Investigations regarding the appearance of advertisements in the "S.A. Naturalist" are being made, as this would assist in reducing the overall cost to the Section of our Journal.

The work of the secretary has been greatly facilitated by the purchase of a portable typewriter. The treasurer and assistant secretary are working on a new card index of members bringing this up to date.

Finally, I would like to express our thanks to the Royal Society of South Australia, which grants us rent free our room for our monthly Committee and Club meetings; to our honorary Auditors; to the members of your Committee, most of whom have been regular attenders at the Committee meetings, for their active support in all matters affecting the welfare of the Section; to the Treasurer who has kept a watchful eye on our finances; and to all others who have assisted our work.

C. MOLINEUX, Chairman.

The Annual Report of the Botany Club for the Year ended 23rd June, 1952.

Ladies and Gentlemen,

I have pleasure in submitting the Annual Report of "The Botany Club."

Apart from the change of Secretaryship, no other change has occurred in Committee members. Miss Stockham who proved a very efficient Secretary, with her enthusiasm and interest was unable to continue in this position owing to pressure of other business. Members are very grateful for the good work she has done during the year.

Our Club has been presided over, during the year by an excellent botanist, Mr. Lee Rowe, and when he married early in the year, members conveyed their best wishes to him.

The average attendance at meetings for the year 1951-52 was good, and Saturday outings devoted to Botany were popular, especially in the Springtime, when ample material is available for study.

Mr. E. W. Pritchard, to whom in the past we have been indebted for his reliable and educational lectures, has again this year been our instructor at the Study Circles. We are grateful to him for arrang-

ing our annual programme of lectures and instructing us on botanical subjects. These meetings are popular as members have the opportunity of examining both freshly gathered and pressed specimens of native flora which may have been gathered on recent outings or holidays. This is an excellent way to become familiar with flora of other States. Attention this year was focused on botanical families which include our native and introduced weeds, plenty of handy specimens being available.

As the object of the Botany Club is the conservation of the native flora of the State, Arbour Day is of special importance to us, and this year Arbour Day was blessed with the much-needed rain during the preceding week, and so, it is with high hopes that we watch our newly planted flora at the reserve at National Park. As our native flora seems to be forever shadowed by the threat of extinction by encroaching civilization, it is with gladness that we look upon any fostering of the native flora in home gardens and reserves.

—L. E. ROWE,

Chairman.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A. INCORPORATED.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 30th JUNE, 1952.

RECEIPTS.						EXPENDITURE							
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Bank Balance, 30th June, 1951				266	7	2	Printing S.A. Naturalist	51	1	6			
Subscriptions, Ordinary and Juvenile Members				98	15	0	Printing Programmes	19	14	11			
Proceeds of Wild Flower Show				123	12	0	Printing Posters	1	10	0	72	6	5
Excursions				70	3	6	Postages in bulk	6	16	3			
Sale S.A. Naturalist	4	4	6				Postage Stamps and Duty Stamps	8	0	0	14	16	3
Sales Badges	4	0	6				Stationery				22	1	7
				4	5	0	Sundries—Wreaths	1	3	0			
Bank Interest				..6	1	2	do. Pins on 36 Badges at 1/3 each	2	5	0	3	8	0
Contribution by the Royal Society of S.A. Inc. for publication of S.A. Naturalist				45	0	0	Secretary's Expenses—				17	17	7
							Postages, Telephone Calls, Stationery						
							Subscriptions—						
							"Wild Life"	1	7	0			
							"Walkabout"	1	4	0	2	11	0
							Donations—						
							Wild Life Sanctuary	10	10	0	21	0	0
							Mark of appreciation to Mr. Gunter	10	10	0	10	0	
							Libraries Board Overtime						
							Typewriter, Portable, Oliver No. 5115648 for use of Secretary				30	0	0
							First Aid Equipment				3	0	0
							Rent G.P.O. Letter Box				2	0	0
							Honorarium to Secretary, 1951	10	10	0			
							Honorarium to Assistant Secretary	1	1	0	11	11	0
											1	1	0
							Hire of Epidiascope				40	16	8
							Expenses Wild Flower Show				68	12	0
							Excursions						
							Subscriptions paid to Royal Society of S.A. Inc., 180 Ordinary Members at 5/-				45	0	0
							Bank Balance, 30th June, 1952				257	12	4
											£614	3	10

G. L. GREGOR, Hon. Treasurer.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A. INCORPORATED.

STATEMENT OF ASSETS AND LIABILITIES, 30th JUNE, 1952.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
NIL.				Balances at Bank—			
Bolence of Assets over Liabilities	538	18	1	General Account	257	12	4
				Life Membership Fund	69	5	2
				Colored Plate Fund	11	11	2
				Conservation Fund (Belair)	22	9	5
				Conservation Fund (New)	10	18	8
							371 16 9
				Cupboards			5 0 0
				Library			40 0 0
				S.A. Naturalist Magazines			40 0 0
				Film Toolach Wallaby			10 0 0
				Badges, 31 at 4s. 6d.			6 19 6
				Flower Show Equipment			10 0 0
				Canvas Shelter			1 0 0
				Camping Utensils			2 10 0
				Postage Stamps on hand			3 7 10
				Stationery on hand			8 4 0
				Amplifier			10 0 0
				Typewriter			30 0 0
							£538 18 1

A. MOLINEUX, Chairman.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 30th JUNE, 1952.

We have examined the books and vouchers setting forth the transactions of the Field Naturalists' Section of the Royal Society of S.A. Inc. for the year ending 30th June, 1952 and certify that the above account of Receipts and Expenditure is correct.

F. GRAY
E. G. SHUTTLEWORTH } Honorary Auditors.

THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF S.A. INCORPORATED.

LIFE MEMBERSHIP FUND.

	£	s.	d.
Balance at Bank 30th June, 1951	60	10	8
Subscription	7	7	0
Bank Interest	1	7	6
	£69	5	2

	£	s.	d.
Balance at Bank, 30th June, 1952	69	5	2
	£69	5	2

COLORED PLATE FUND.

	£	s.	d.
Balance at Bank, 30th June, 1951	11	0	9
Donation		5	6
Bank Interest		4	11
	£11	11	2

	£	s.	d.
Balance at Bank, 30th June, 1952	11	11	2
	£11	11	2

CONSERVATION FUND (BELAIR).

	£	s.	d.
Balance at Bank, 30th June, 1951	24	1	7
Bank Interest		9	10
	£24	11	5

	£	s.	d.
Requisites for Arbour Day	2	2	0
Balance at Bank, 30th June, 1952	22	9	5
	£24	11	5

CONSERVATION FUND (NEW).

	£	s.	d.
Balance at Bank, 30th June, 1951	9	8	2
Donations	1	5	6
Bank Interest		5	0
	£10	18	8

	£	s.	d.
Balance at Bank, 30th June, 1952	10	18	8
	£10	18	8

Examined and Certified Correct.

F. GRAY
E. G. SHUTTLEWORTH } Honorary Auditors.

Book Reviews – South African Plants

"Wild flowers of the Cape of Good Hope"
1950, Elsie G. Rice and R. H. Compton.

"Wild Flowers of the Cape Province"
1951, Mary M. Kidd.

"Flora of the Cape Peninsula"
1950 edit., R. S. Adamson and
T. M. Salter.

Reviewed by T.R.N.L.

The amateur or professional botanist—or for that matter the home gardener—does not take long to discover the number of plants native to South Africa which are either growing spontaneously or artificially in South Australia. This is not surprising when we recall the general similarity of climates between these two regions, nor

the colourful, interesting and beautiful plants which early caught the eye of the plant collector. For most of the South African plants naturalised in South Australia were previously introduced into this country on account of their brilliantly coloured flowers, so much prized by the home gardener to give "a show in the spring."

That some did not last long as subjects is apparent! Today the yellow fields of *Oxalis*, the blue patches of *Babiana*, the orange sheets of *Homeria*, the vermillion swards of *Sparaxis*, the undergrowth of *Osteospermum* (now *Chrysanthemoides*) or the pathways of *Morea* or *Romulea* are too frequent to need description. But since we have been warned we can be watchful, although today plant introducers are more careful of what they import to beautify our gardens. But who has not attempted to grow *Proteas*, *Leucospermums*, *Leuca-*

dendrons, *Pelargonium*, *Ericas*, *Psoralea*, *Polygala*, *Stapelia*s and a host of others and wished that these plants too would more readily adopt the free growth with which some of their now unwanted compatriots have made. The books mentioned above are worthy of notice, if however, for no other reason than they are notable contributions to botanical literature dealing with plants as unique as those of Australia.

"*Wild Flowers of the Cape of Good Hope*" by Rice & Compton, and published by the Botanical Society of South Africa is one of the most beautifully produced books dealing with this type of work which the reviewer has seen for a long time. This book has an extremely useful introduction, included in which are details of the affinities and geographical distribution of the Cape plants, including localities, habitats and flowering periods of these, nomenclatural problems and notes relating to the use of common and scientific names; while not the least interesting—and to members of our Section probably the most important—are details regarding the protection given to the native vegetation. The major portion of this volume is however taken up by full page (8" x 6") colour plates of some of the most interesting and beautiful examples of the South African plants.

Usually only one species is depicted in each plate, but in some two, whilst in the case of *Ericas*, a dozen or more species are illustrated per plate. In all 250 plates are published, giving in all a total of between 300 and 350 species. A small number you may say for a region which although small can boast of over 2,500 indigenous species! But surely this small number of colour illustrations is better than the almost complete absence of such a publication, for such is our lot—at least at the present time—in South Australia. The artist—Mrs. Garrett Rice has—as Professor R. H. Compton, Director of the Kirstenbosch Botanical Gardens, and co-author of this book truly said—"Laboured with great patience, accuracy and long skill and produced a series of paintings which are useful to the botanist, the gardener, naturalist or to those who simply enjoy beauty."

Naturally we find many of our "weeds" and garden favourites depicted therein,

whilst the amateur botanist—and gardener—will find this publication of use in assisting with the identification of discoveries made within the cultivated areas of this State. The text of the book is well written and set in clear and easily read type. The blocks are really excellent and show only too well that we have by no means introduced from this region all its beauties! As it is produced under the aegis of what we could almost call a "sister society" it shows what can be achieved if we are really anxious to have something done!

"*Wild Flowers of the Cape Peninsula*" by Mary Kidd, with descriptive text by Captain T. M. Salter is less pretentious but in some ways a more satisfactory book. There are 94 coloured plates illustrating some 800 species, so that it is complementary but mainly supplementary to the previous book. Opposite each plate is a brief but concise description of the plants, whilst major headings and sub-headings indicate the habitats (marsh, sea, bush, shady places etc.) and flowering times of the plant. The book is set up as a calendar year thus assisting in the identification, for nearly all the plates comprise a number of unrelated species, excepting some *Protea*ceae and *Ericas*, thus making determinations easier.

As a great number of our weeds hailing from South Africa are shown, this book is likely to be of greater use and value to the botanist in South Australia than the first volume. Whilst the crowded appearance of some plates rather detract from the whole, the book is excellently produced and the block makers have faithfully carried out what was obviously a hard task. The descriptions are brief but adequate, whilst the introduction and map make it a most useful publication. Its size—9" x 6" permits it to fit easily into an outside coat pocket and thus it is possible to use it for field identifications—the ultimate for any book dealing with plants, animals or insects.

"*The Flora of the Cape Peninsula*" by Adamson and Salter, is as the name indicates a "botanical flora" in the accepted sense of the word. A massive volume, containing about half as many pages again as Black's *Flora of South Australia*, and of the same format size, although it lacks the helpful and accurate sketches which are so

valuable in Black. Descriptions of over 2,620 species, distributed in 702 genera are given, and this number is from an area of approximately 182 square miles! The introduction is a valuable contribution to the Flora, but perhaps a few notes on the history of plant collecting in the area would have made interesting reading without in any way detracting from the scientific importance of the work.

The botanical keys throughout are excellent, emphasis being placed on floral and fruit characteristics. Families showing variations in these are faithfully "keyed" out several times, thus reducing the possibilities of mistakes in determinations. The descriptions given are complete including authorities and synonymy. It is unfortunate that no differentiation is made between indigenous and naturalised plants, for such information is always helpful to the local as well as the overseas botanist. But the usefulness of this work to the botanist in South Australia is great. It had been seen by J. M. Black before his death, and is now being used by his editors when dealing with plants from this region which have become naturalised in this State. To the student or botanical worker endeavouring to reduce the chaos in the naturalised species of *Oxalis*, *Babiana*, *Homeria*, etc., this volume is most welcome. It is well produced, the type is large and therefore easy to read, and altogether is a first-rate piece of work.

Each of the above books has an excellent index, including popular names, whilst the last includes synonyms, as well as an adequate and useful glossary of botanical terms. The publishers in each case have taken great pains to produce a really first class job and these volumes will long remain standard and useful works to the botanist in South Africa and the plant cultivator or botanical worker in South Australia.

It is impossible to overlook changes in nomenclature which are listed and recorded in these volumes. The most important is perhaps that for "soursofs" which is now *Oxalis pres-caprae*, but it is doubtful if "this plant by any other name could . . ."

"FLORA OF THE CAPE PENINSULA" edited by R. S. Adamson, M.A., D.Sc. and T. M. Salter [Capt.(s) R.N. Retd.] 1950;

889pp.; 2 maps inside cover; 9½" x 6", in cloth boards, £SAf.12/15/0, Juta and Co. Ltd., Cape Town and Johannesburg, South Africa.

"WILD FLOWERS OF THE CAPE PENINSULA" (painted by) Mary Mayham Kidd, 1950, with text compiled under the supervision of T. M. Salter; 94 plates in colour with cloth boards and coloured dust cover, plus corresponding text, plus map, i-xvi Intro. and i-xvii Index (8½" x 5¾"), Cape Town, Oxford University Press, £SAf.3/3/0.

"WILD FLOWERS OF THE CAPE OF GOOD HOPE" by Elsie Garrett Rice and Robert Harold Compton 1951, 250 full page colour plates plus 3—24 pp. Intro., plus i-vi Index; 10¼" x 7½", cloth boards and dust cover (colour), Delux and signed edition £SAf.6/6/0, Standard edition £SAf.2/10/0 (as per review); Issued by the Botanical Society of South Africa; Kirstenbosch, Newlands, C.P., South Africa.

The Spread of *Nicotiana* spp. in Australia

"Because of man's intervention, it is today hard to say just what were the original areas of distribution of the various Australian species of *Nicotiana*. Many years ago in Australia, cattle were driven over long distances to market or to seasonal pasturage, and the minute seeds of trailside *Nicotianas* were caught in their rough coats and carried far away from their native homes, to grow and mingle and cross with cousins that were originally distant both geographically and botanically."

Plant Hunters in the Andes, 1941.

By T. HARPER GOODSPEED,

From my experience in collecting our species of *Nicotiana*, more particularly in South and Central Australia, I think it is very unlikely that the seeds have been distributed over long distances by cattle, so as to give rise to hybrid stocks. The seeds are so small that severe duststorms might easily transport them for considerable distances.

—J.B.C.

The Field Naturalists' Section

EXCURSIONS :

- Aug. 2—Port River, Osborne. Subject: Shells. Leader: Mrs. Turnbull. Outer Harbour train at 1 p.m.
- Aug. 9—The Upper Parts of Brownhill Creek. Subject: Botany. Leader: Professor J. B. Cleland. Choates bus Victoria Square East at 12.30 p.m.
- Aug. 16—Richmond Tram Terminus. Subject: Pond Life. First tram after 1 p.m.
- Aug. 23—Henley South. Subject: Sandhills Flora. First Henley car after 1 p.m.
- Aug. 30—Tea Tree Gully and Hermitage Area. Subject: Flora. Bowman's bus Victoria Square. 12.45 p.m.
- Sept. 6—Mr. F. C. Payne's Wildflower Garden at Black Hill. Lang's bus 12 noon.
- Sept. 21 (Sunday)—Belair to Mt. Lofty. 10.20 a.m. train to Belair.
- Sept. 27—Mr. Bottrill's Property at Hope Valley. Bowman's bus 12.45 p.m.
- Oct. 3 & 4—WILDFLOWER & NATURE SHOW. To be held in the Liberal Club Hall, North Terrace, Adelaide.
- Oct. 13—LABOUR DAY HOLIDAY. Bus trip to Monarto South. Fare, 12/6.

MONTHLY GENERAL MEETINGS :

COMMITTEE MEETINGS :

- August 19—Lecturette by members.
- September 16—Presentation of F.N.C. Prize to Mr. White.
- September 22—Mr. Crosbie Morrison will give a SPECIAL Film Evening.

- August 12
- September 9
- October 14

BOTANY CLUB :

CONCHOLOGICAL SOCIETY :

- Aug. 25—Leguminosae, Acacia.
- Sept. 22—Leguminosae (*Papilionatae*
and *Caesalpinoideae*).

- Aug. 20—Cowries.
- Sept. 17—Crepidopoda.

All meetings of the F.N.S. are held in the Royal Society's Rooms, Institute Building, North Terrace, at 8 p.m. for monthly general meetings, and 7.45 p.m. for committee and club meetings.

For excursions by train meet on train after obtaining ticket.

For excursions by tram meet at T. & G. corner.

Bus trips (unless otherwise stated) leave from the corner of Kintore Avenue and North Terrace, at 8.30 a.m. for all day trips, and 1 p.m. for afternoon trips. Persons desiring to attend should contact the Treasurer, Miss G. L. Gregor at the School of Mines (W 1771) at least 7 days ahead.

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~~Simon~~ 10/02/11

